IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication OCTOBER 20, 1960

Leonard Schugar

☆ Crucible Steel's Day and Hunter Discuss—

Will Vacuum Melting Find Firm Markets? p. 113

Reaction to Depreciation Survey p. 118

New Steel Takes One-Coat Enamel p. 151

Digest of the Week p. 2-3

Photo courtesy The Maytag Company

Aristoloy Leaded 8620 cuts tool changes 50% on wringer drive sleeve for Maytag

Has working time been reduced? Yes.

In what way? The use of Aristoloy Leaded* has increased tool life and reduced downtime for tool changes.

Has machining been improved? Yes.

What inherent quality in the steel is responsible for improved machining? A more uniform, satisfactory microstructure provides better machining characteristics.

What operation is performed? Automatic screw machines bore, counterbore and cut off. Secondary operations include milling, drilling, internal and external grinding after carburizing.

For complete information about Aristoloy blooms, slabs, billets and bars, in carbon, alloy, stainless and leaded, call the Copperweld representative in your nearest large city—or write for NEW PRODUCTS & FACILITIES CATALOG.

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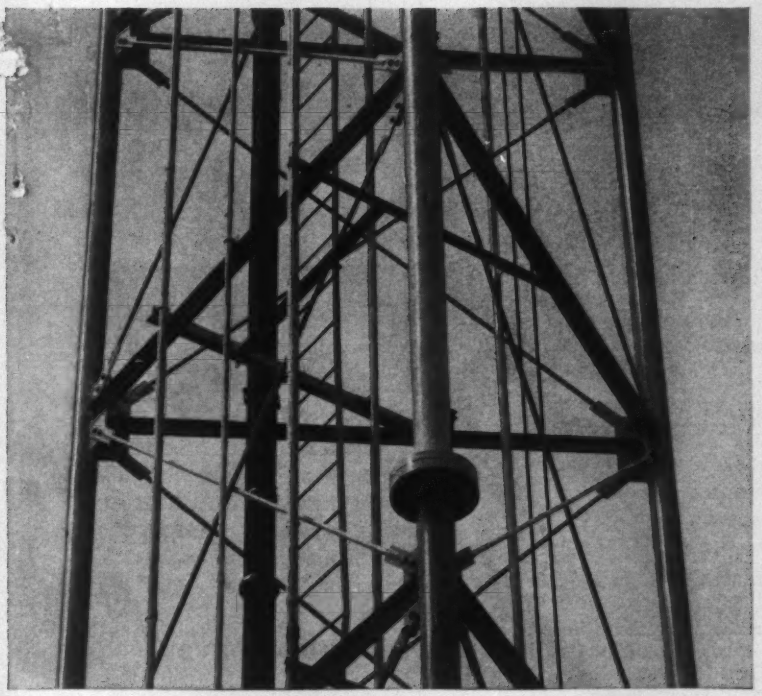
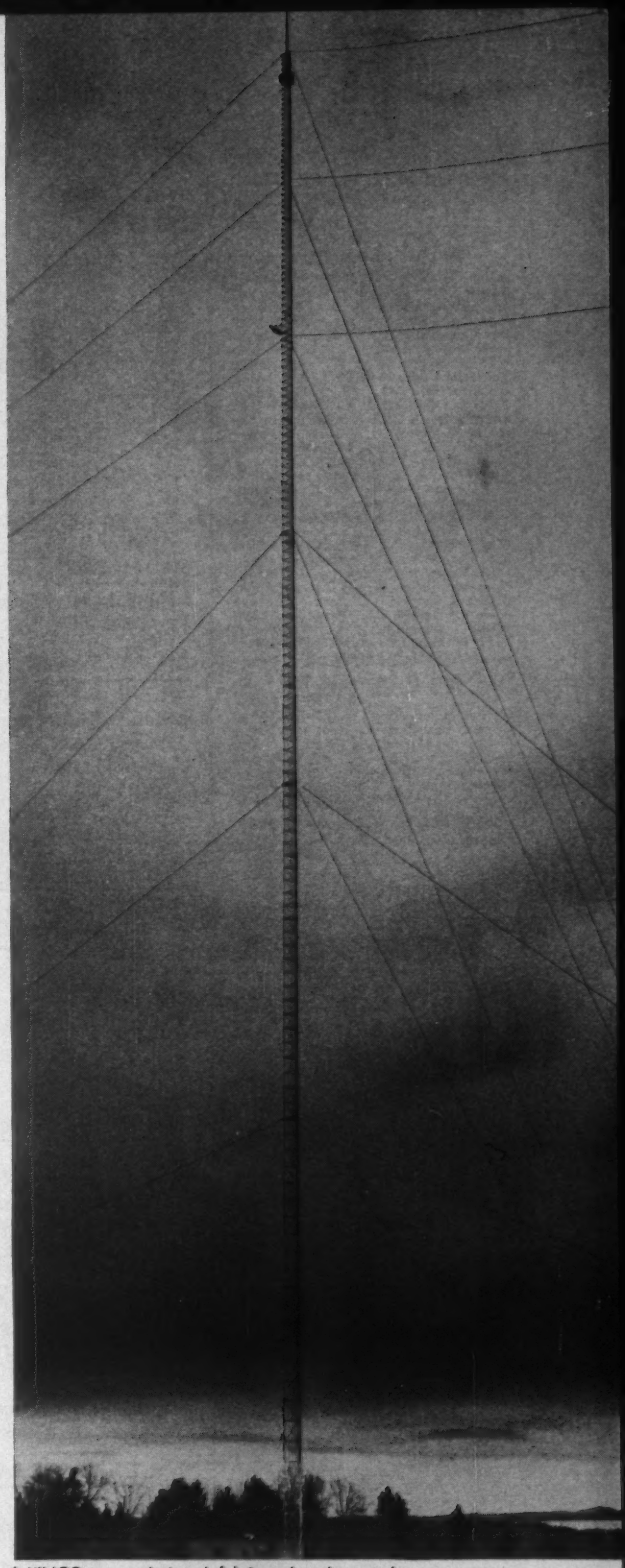


Legs of high-strength steel cut deadweight in 1,619-ft TV tower

How to support an 11-ton antenna 1,619 ft above the ground—higher than man had ever built before? Kline Iron & Steel Co. handled this tricky job last fall. WGAN-TV, Portland, Me., now broadcasts over an area of 75-mile radius.

A giant triangular prism, 10 ft on a side, the 260-ton tower is supported all the way up by three slim legs of Bethlehem Medium-Manganese steel bars. By utilizing this high-strength steel, Kline was able to reduce deadweight of the legs by almost one-third (compared to conventional A7 steel). The legs are only 6-in. in diameter at the base of the tower, and 4½-in. at the top; yet they're strong enough to help the tower resist wind velocities up to 150 mph.

Bethlehem Medium-Manganese steel has twice the atmospheric-corrosion resistance of carbon steel, and can be welded satisfactorily by the proper technique. It's available in bars, bar shapes, plates, structural shapes, sheets, and in other forms. For more information about this versatile steel, simply contact your nearest Bethlehem sales office. Or write to our Publications Department for Folder 628, *Bethlehem Medium Manganese.*



A KIMCO tower, designed, fabricated, and erected by Kline Iron & Steel Co., Columbia, S. C.

Bethlehem Steel Company, Bethlehem, Pa. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

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The IRON AGE

October 20, 1960—Vol. 186, No. 16

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News of the Industry

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New Gas Appliances—The annual American Gas Association convention was "loaded" with new ideas and new products. Target: Hold and expand the line in the highly competitive race with electricity. P. 117

DEPRECIATION SURVEY

Early Results—Preliminary reports of Treasury Dept. survey of depreciation practices show reform is wanted. Results will have an important effect on new tax legislation. P. 118

CAN MARKETS

More Aluminum Entries—Competition continues to grow in the

aluminum can market. Central States Can Corp. is the newest entry with a pre-coated can. P. 119

COMMON MARKET

On the Spot—IRON AGE editor

Metalworking

Cover Feature

Vacuum Melting—Crucible Steel's Joel Hunter (r) and M. J. Day are among those confident of growing markets for vacuum melting. This week's special report analyzes present and potential markets for the process. P. 113

George Sullivan gives his views of the chances of the European Common Market to stand up under lean years. Up to this point the new ECM has had good times. P. 120

WEST COAST

Space Progress—Space age research and development must be converted into hardware. When this happens, a group of engineers notes, progress will come with breathtaking speed. P. 131

Engineering-Production Developments

NEW ENAMELING STEEL

One-Coat Process — For years, enamelers have used a ground coat on steel to prevent boiling and fish-scaling. Now a new one-coat porcelain-enameling steel does away with the ground coat. As a result, overall enameling costs have tumbled 15-30 pct. The newcomer contains very little carbon. P. 151

QUALITY DUCTILE IRON

Through Statistical Control—The secret of success in making good ductile iron is absolute control over the melting facilities and procedures. By correlating performance data on inspection, testing and analysis, a central control group can determine more realistic costs and set smoother schedules. P. 154

CORROSION RESISTANCE

At 1000°C — It's not easy to fabricate brittle nickel-aluminum alloys into complex shapes. By using these alloys as coatings—rather than as base metals—then electroplating them on ductile metals, very useful corrosion-resistant shapes are obtained. P. 156

STEEL OUTPUT DOUBLED

With New Technique—Ford Motor Co.'s new openhearth steelmaking technique is moving ahead. Results show that a new process reduces by one-half the time required to make a ton of steel conventionally in the same furnace. P. 158

MODERN STEEL ANALYSIS

Fast and Accurate—By using a spectrometer, a new steel plant can analyze a given heat and return a complete report to the operating team within six minutes. The unit checks all elements in steel and slag except carbon and sulphur on a round-the-clock basis. P. 162

Market and Price Trends

HIGH-ENERGY FORMING

Handles Tough Jobs—New techniques are being used to form missile parts out of high-strength materials. They show promise of being useful for other metalworking jobs as well. P. 121

AUTOMOTIVE

Automation's Effect—Does the use of automation by industry mean less jobs? An official of the Ford Motor Co. notes that it's impossible to weigh the real effects of automation on employment. P. 127

STEEL SUMMARY

No Hedge Buying—Steel users aren't planning on any price increases this fall. That means there will be little hedge buying in advance of the Dec. 1 wage increase to steelworkers. Consumers believe there is too much pressure now for a price boost. P. 201

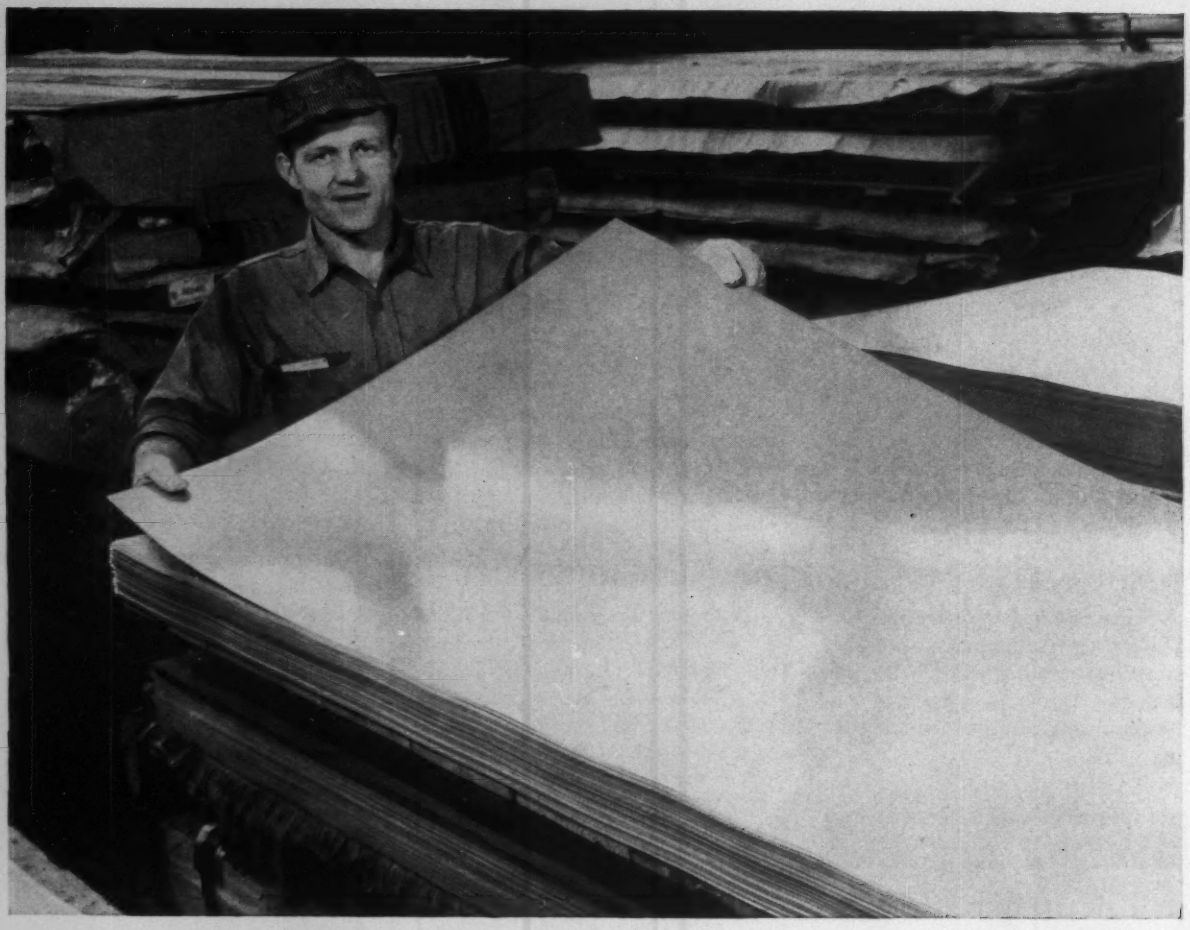
PURCHASING

New Dimension—The space age has opened a dimension in purchasing. Jack Benzie, GE's Missile and Space Vehicle Dept. purchasing manager tells what a fast pace the era of rockets and missiles has set for his department. P. 202

NEXT WEEK

INDUSTRIAL WATER

Will There Be Enough?—Industry's water needs will more than triple in next 40 years. Next week's Special Report describes what's being done to locate new sources, reuse present supplies, and convert saline water.



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Fighting Communism: Why Is It So Difficult?

Given their way, it is always possible for us to get along well with Premier Khrushchev and his counterparts in China—until the point is reached where they can effectively bury us.

It is strange so many Americans insist on thinking of the Reds as they do of their brothers, sisters, or neighbors. There is quite a difference. The double-dealing, dishonesty, propaganda, lies, and double-crossing by the Reds should be enough for anyone to see the light.

Often, we cannot make too much progress against Communism because we are a democracy. We can't order people around. We don't and won't lie and use international deceit and chicanery to prove our point.

We know that underprivileged nations often fail to see us as we really are. We know, too, that at times they fall for the Reds' version of us. But it is more than difficult to meet such diabolical and deceitful Communistic actions with our Judaic-Christian pattern of behavior.

We must not only remain strong militarily; we must stay strong economically. Not to do so would rob us of our ability to meet the Reds everywhere with strength and purpose. But just saying this oversimplifies our future problems.

We cannot and will not turn our democracy into a dictatorship in order to fight Communism. To do so would deny the very principles for which we stand. Yet we must find some better way to stand out in the world where our allies and uncommitted millions will see that our true purpose is to fight for and to support the dignity of mankind.

The true purpose of the Reds is to conquer and rule the world. To believe otherwise is to delude ourselves. To threaten us, to frighten us, and to demean us in others' eyes is the way the Communists hope to hasten an abject surrender on our part. There isn't a chance that we would dream of such a thing.

But standing up against such a cunning and formidable enemy will take all the leadership we can muster. It will take all the heritage of courage in our veins. It will take all the discipline of which we are capable. And, finally, it will take all of the spiritual help God can give us.

The menace of Communism is not a conversation piece. It is a devilish threat to the entire Free World.

And it looks like a never-ending battle.

Tom Campbell

Editor-in-Chief

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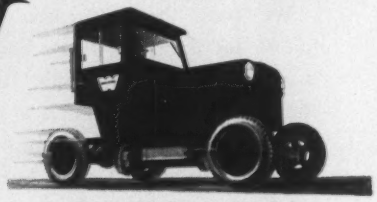
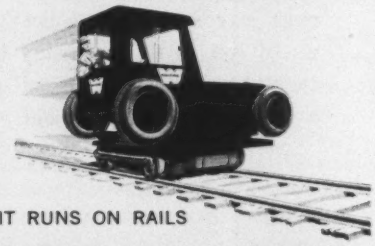


IT RUNS ON WHEELS



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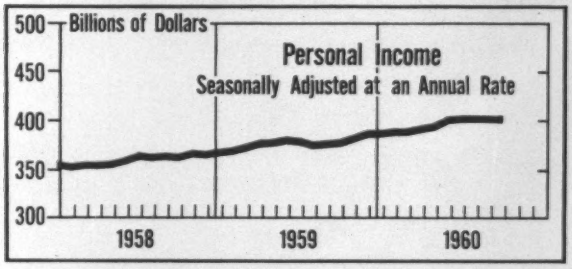
Total Income High; But Spots Show

Government and service payrolls continue to carry the load as personal income goes to new records. How-

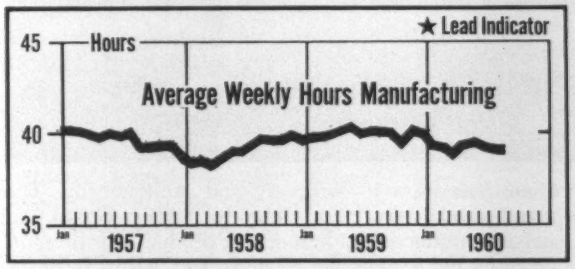


ever, in September, factory payrolls dropped to a 10-month low as the rollback continues to cut into industrial activity. All in all, personal income rate rose $200 million in September to $408.4 billion seasonally adjusted rate.

Factory payrolls dropped to an annual rate of $87.2 billion in September. This is a drop of $500 million from August and the lowest point since November, 1959. With factory payrolls not likely to rise in October, and no great trend in sight for service industries, October income may be down slightly.

Manufacturing Workweek Declines

Hours worked in manufacturing dropped off to 39.6 hours per week in September, down 0.2 hours from August. This sensitive leading indicator could mean



trouble. It usually increases in September, a fact that underscores the decline. Possible negative result: Decline or at least caution in consumer spending. This indicator leads unemployment and employment figures and is one of the most sensitive to watch.

Automotive News Is Mixed

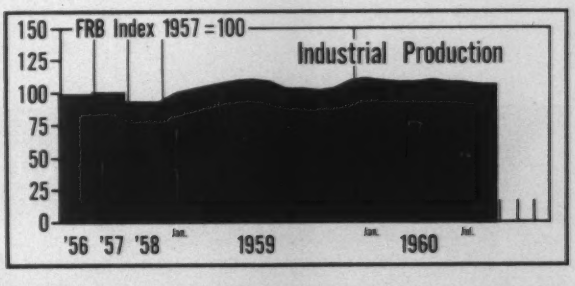
Auto output is beginning to pick up, but October schedules are now lower than expected. Auto production will begin to hit close to 150,000 a week. The rub: October schedules now call for about 660,000 cars, less than original estimate of 685,000. Among the automotive sidelights: More compacts as a per cent of output; some further shortening of inventory. One major auto producer is cutting its steel inventories from 45 to 30 days.

Military and Space Spending Trends

Here's a significant appraisal of military spending and space age programs by M. L. Weidenbaum, corporate economist of Boeing. He predicts military spending to rise to $49 billion in 1970. This compares with the current $41 billion. He believes that commercialization of military technical advances will take a new tack. Instead of adapting military end-products, it will take the form of utilization of new methods and processes.

Production at 10-Month Low

The expected decline in durable goods manufacturing sent the Federal Reserve Board's Index of Indus-



trial Production to a 10-month low in September. The index declined to 107 seasonally adjusted. (1957 = 100) The August rate was also revised downward from the preliminary 109 to 108.

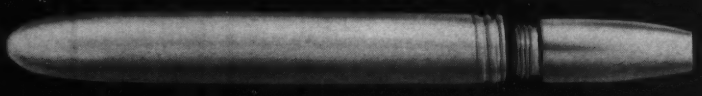
The index for durable manufacturing dropped from 104 to 102 during the month, to lead the decline. Nondurables held level. The outlook for October is for a leveling.

Little Change Expected in Steel

Although steel operations are now off the bottom, there is little reason to hope for a significant upturn. None of the major markets shows the resilience needed to give them a lift. It may be that there will be no significant change in the order volume this year. This means orders will come in at a rate to justify operations not much higher than the present rate.

On screw machine products

Alcoa puts the metal where you want it



Flo-Master Felt Tip Marking Pen made in clear, black and seven other Alumilite* finishes by Alcoa for Cushman & Denison, Camden 1, N. J., a subsidiary of The Esterbrook Pen Company.

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IUE: Loses Support; Takes a Breather

Weakness of the position taken by the International Union of Electrical Workers in its negotiations with industry giants is beginning to show.

The union lost significant support for its strike against General Electric Corp. when Local 301, Schenectady, agreed to a contract extension on the company terms—the expired contract without the disputed cost-of-living escalator clause. Workers returned to work Monday. The 8700 member local is the largest of the union's GE locals.

The union also postponed a showdown with Westinghouse Corp. IUE negotiators agreed to a one-week contract extension about 30 minutes before it expired at midnight Saturday.

IUE president James B. Carey called the move by the Schenectady local "a direct violation of the IUE contribution."

The local had originally voted not to strike. However, it went out when the company failed to offer the same terms in its extension offer to all IUE locals. Leo Jandreau, business agent for the defecting local, said this was no longer the case.

Several other large GE locals had originally voted against the strike. Syracuse waited four days before joining the walkout. At the beginning of the week there was no indication other locals would follow 301 back to work. However, several locals admitted they were "reappraising" the situation.

Rail Merger Hinges On Job Security

Railroad unions won a big point in their legal efforts to protect jobs of workers when railroads merge.

Merger of Delaware, Lackawanna & Western Railroad Co. into the Erie Railroad Co. was permitted only after the railroads and the unions reached an agreement saving jobs of workers now employed by the roads, according to a decision handed down in Detroit last week by U. S. District Court Judge T. P. Thornton.

Railroad and union lawyers had no difficulty in reaching such an agreement. But the decision is an important victory for rail unions, faced with the prospect of wholesale layoffs as railroads talk merger to effect operating economies.

Brotherhood of Maintenance of Way Employees, and the Railway Labor Executives Assn., acted for all 22 rail unions. They brought the suit to halt the merger against the Interstate Commerce Commission.

Unemployment Drops More Than Seasonally

As usual, unemployment dropped for September. The drop was more than seasonal, leading to a statistical decline.

Unemployment for the month was 3,388,000, down 400,000 from August. A seasonal drop of only 300,000 was expected.

But a key figure is the number of unemployed who have been without work for 15 months or more. That figure stands at 800,000. Many experts believe it should be no more than 600,000.

A closer check shows many of the 800,000 are people in older age groups who may not get work again —or at least they won't get work soon.

Incentives Can Be Costly

Small-lot orders are up—and so are costs. But there are remedies, according to management engineers participating in the Industrial Management Society's Small-Lot Manufacturing Seminar.

Here are some ways to keep from being nickel-and-dimed out of profits:

Make "start up" time a separate part of the job, with its own incentive, when establishing the incentive rate for a new job.

Establish the principle of temporary rates for new jobs in labor contracts. Have a clause allowing a rate change when there's a motion change as well as for method or machine changes.

Temporary rates should apply during the period workers learn new jobs. The rate is relatively high, worker output is low. As the job is learned, output goes up; the incentive should drop.

Different companies have different methods of determining incentives, but many make use of "learning curves" as well as time-motion studies.

Watch timecards for excessive incentive earnings. They could mean a payroll accounting error. Or they could mean incentive rates were set while a worker was still fresh on a small-lot job. Either he's learned the job, or it has become a production-size job and the incentive is too high.

Watch the learning curve. Often, workers are assigned several jobs each day. With each new job, output falls. However, the learning curve is still there; it just takes longer.

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★ Patent Control Challenged

Industry had better prepare to fight for its rights to patents developed through government contracts.

The patent controversy—should government or industry get the bulk of patent royalties—will reach the boiling point when Congress meets in January. Bills designed to cut industry's present share of patents are definitely scheduled.

Senator Joseph C. O'Mahoney, (D., Wyo.), backer of stricter patent standards, has retired. But the movement to give the government more profit from patents developed with Federal tax money will be carried on by several other congressmen. And support for their plans is growing.

Industry may be too complacent. A private study of government patent policies, which could help industry, has gotten little corporation attention. The George Washington University Patent Foundation, making the survey, asked a cross-section of contractors to help in the survey. So far, industry response has been poor. The report to government is due out in December.

Though no patent bills got through the past session of Congress, some minor bills containing patent clauses became law. The trend of these laws was toward strict limitation of industry use of patents coming out of government research.

Word from those closely connected with the industry-government controversy is that despite the trend, strict laws don't have enough support. But these sources say there will be a compromise. A compromise might mean loss of patents to companies dealing with such agencies as the Defense Department, the Federal Aviation Agency, and the General Services Administration.

■ Mitchell Opposes Work Week Law

Labor Secretary James P. Mitchell is opposed to any reduction in the standard 40-hour work week by federal legislation.

Mitchell says that a change in the Fair Labor Standards Act to provide for a 35-hour week, as recommended by the AFL-CIO, would be impractical and would damage the nation.

■ FTC Wants Broader Powers

The Federal Trade Commission is seeking broader and broader policing power and the money and men that go with it. The record number of cases in 1960 is not enough for FTC leaders.

The agency hopes to almost double its staff next year. And it will ask Congress for an unprecedented 50 pct budget increase. It wants a total staff of 650 and a total budget of $12 million.

The main objects of broadening powers are antitrust violations and deceptive business practices. The FTC plans to leave no stone unturned in its efforts to ferret out violators.

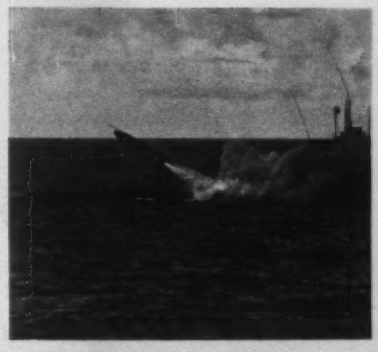
■ Can Lost Missile Work Be Salvaged?

A Senate Government Operations Subcommittee is studying the possibility of salvaging some data from $2.1 billion worth of cancelled weapons research projects.

Senator Hubert H. Humphrey (D., Minn.), chairman of the subcommittee, notes, "The question which this particular subcommittee is exploring is: How much of the $2.1 billion would tend to go completely down the drain? That is, to what extent would at least partially useable data be salvaged from the cancelled projects, so as to avoid needless future repetition of experiments?"

Funds for these projects were allocated long before the projects were actually cancelled. Some critics contend that the projects should never have been initiated or, at least, should have been cancelled sooner.

Largest of the cancelled research projects include: "Navaho," $679.8 million; "Rascal," $448 million; "Sea Master," $387 million; and "Regulus," $210 million.



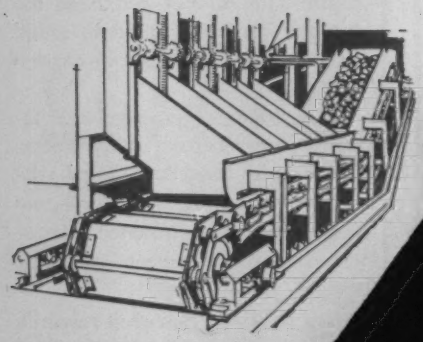
REGULUS: $212 million wasted?

The Dept. of Defense has a procedure for salvaging information from cancelled projects through the filing of termination reports. "How well this procedure is actually working," says Sen. Humphrey, "is the $2 billion question."

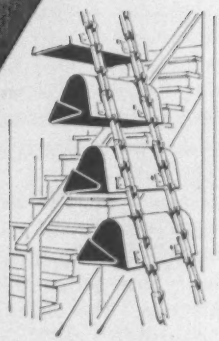
The review is part of an analysis of Government-wide Scientific Information Programs which will be reported on by January 31, 1961.

LINK-BELT long-pitch SS class bushed chain . . .

BUILT FOR THE LONG, HARD GRIND



FLANGED ROLLER TYPE for applications where the chain will operate on various type rails.



PLAIN ROLLER TYPE for applications where the chain will operate in channels, angle guides or vertically.

WHERE the going is tough—especially where abrasion and round-the-clock operation are encountered on long, slow-speed conveyors and elevators—long-pitch SS class chain pays off in low initial cost and maintenance, fewer shutdowns. These heavy-duty chains conform to all commercial standards for clearance and fits; pins and bushings have flats and notches to lock them against rotation in the sidebars.

Industry's most modern chain-producing facilities enable Link-Belt to design and build special-type chains and sprockets to suit specific applications. Get full facts from Catalog 1050. Write direct, or call your Link-Belt office or authorized stock-carrying distributor . . . in the yellow pages of your phone book, under CHAINS.

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World Ore Pact: Would Russia Join?

Russia is prepared to enter into international agreement to export only a stipulated amount of iron ore to avoid unsettling world markets, according to Cyrus Eaton, Cleveland industrialist.

Last week T. M. Rohan, IRON AGE Cleveland editor, interviewed the controversial Mr. Eaton. He said that at the luncheon he gave in New York recently for Premier Nikita S. Krushchev, the Russian Premier said his country is now restricting tin exports and is ready to sign an agreement on iron ore

EATON: With luncheon guest.

to avoid disturbing world markets.

"This is something I have been telling them to do for three years," said Mr. Eaton. "It is of great concern to all countries worrying about the breaking of markets by the Russians. With their Communist system, realistic prices are difficult to ascertain so it's important to have them a part of the international plan to stabilize markets."

Mr. Krushchev said: "Just to cite an example, we are already cooperating with an international organization on the sale of tin, where each country has a quota and the prices are regulated. Why couldn't we have the same sort of thing in iron ore, or any other product?"

Mr. Eaton also said that a delegation of Bulgarian officials who visited in Cleveland told him they were going to put up a steel mill in Sophia even though Mr. Eaton advised it should be on tidewater. The Bulgarian delegation was headed by Tydor Zhivkov, first secretary of the Communist party there.

Tariff Hearings Set For Early 1961

Dickering between the U. S. and foreign nations on who should cut what tariffs won't get started until the first of the year. Bargaining on the U. S. part will be based on recommendations of the U. S. Tariff Commission to President Eisenhower. These will be made next month.

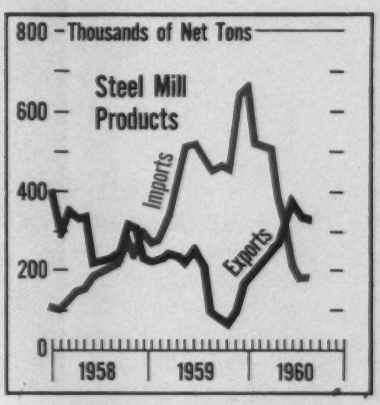
The recommendations, stemming from the recent commission hearings, are cloaked in secrecy so other nations won't know what cards the U. S. holds before talks start.

U. S. representatives are already at Geneva for the General Agreement on Tariffs and Trade (GATT). They believe some cuts will have to be made on imports of foreign goods, but are hoping they can get better tariff cuts for our exports.

Steel Imports Climb During August

The downward trend in steel imports was disrupted in August when imports increased to 184,000 net tons, 7000 tons over the July import figure.

During the same month, exports of mill products dropped 3000 tons to 328,000 tons. These figures, however, contrast sharply with figures for August, 1959, when the steel strike had crippled U. S. steel production. In August, 1959, 324,000 tons were imported and only 65,000 tons were shipped out of the country.



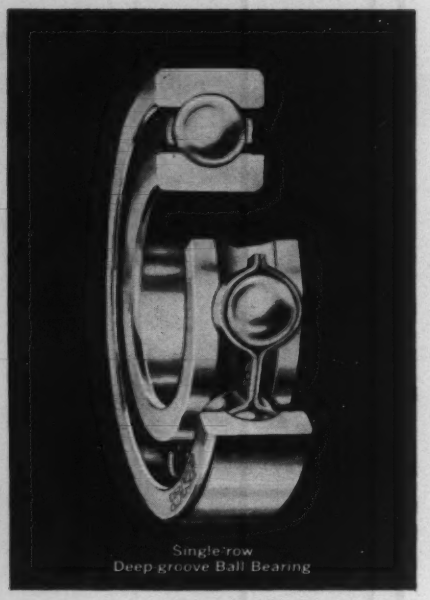
For the first eight months of 1960, imports totaled 2,557,000 tons. Exports for the same period reached 2,125,000 tons, or 4 pct of all steel shipped by domestic mills.

If exports and imports continue for the remainder of the year at the August level there will be a small favorable balance of trade (on a tonnage basis) in steel products for the U. S. in 1960.

British Demand Remains High

The market weakness in Great Britain for consumer durables has not yet had any significant effect on steel demand there. Although steel consumers have been building up stocks in recent months, steel companies report that no marked falloff in orders is expected in the immediate future.

But as the demand for steel remains high, the cost of steelmaking is going up. The British National Coal Board has increased mine prices of coal by an average of 93¢ per long ton. The British Iron and Steel Federation says this will raise the cost of steelmaking by about $1.40 per long ton.



Can a standard bearing offer you "more bearing" for your money?

It can if it's made by SKF—because all SKF bearings, both ball and roller, offer special qualities at "production" bearing prices.

Take the single-row deep-groove ball bearing featured here, as an example. SKF designs and builds this type to sustain heavy radial load and thrust load in either direction. Furthermore, it is engineered to run smoothly and quietly at normal speeds with grease lubrication—and at high speeds with oil.

Yet this is a standard SKF ball bearing, mass-produced by automated production equipment at our plant at Altoona, Pa. You can quickly get this bearing in over 100 sizes, ranging from 5/8" to 15.748" O.D., and in a variety of seal, shield and snap-ring combinations.

But why not find out what SKF offers in bearing quality, availability and economy? Just call the SKF branch office nearest you.

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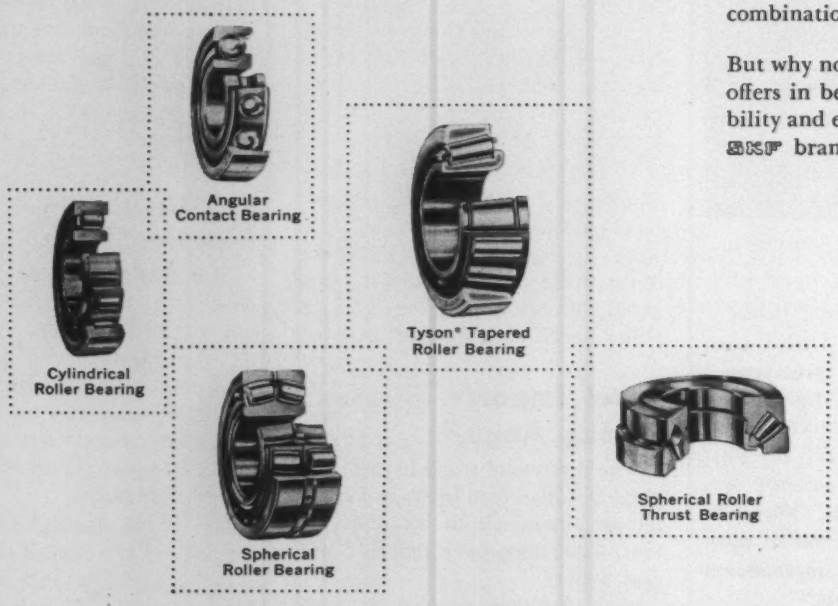

Spherical, Cylindrical, Ball, Tyson Tapered and REED Miniature Bearings
EVERY TYPE—EVERY USE
SKF
SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

Controls Strip Hardness

A digital extensometer helps to control hardness in mills that produce sheet or tinplate. This all-static system measures the amount of elongation of cold-rolled strip as it passes between the work rolls of a reduction mill. Since surface hardness is related to elongation, the end result is another means of controlling quality.

Quench Improves Ductility

For years, lead has served as the quenching medium in wire mills. However, a new low-cost salt bath known as Draw Temp 550, made by E. F. Houghton & Co., is starting to push lead out of the wire mill. The newcomer, with a low melting point of 520°F, prevents lead pickup on the steel. Mills report that the salt bath yields greater reduction of cross section in drawing than they obtain with wire that's quenched in lead.

Oxygen Increases Savings

Openhearth oxygen enables steel mills to get more tonnage out of low-cost facilities. But it doesn't reduce the cost of these facilities. That's the experience of one big mill. From a cost standpoint, this mill is just starting to break even through the increased capacity of furnaces that are inherently low cost.

Vibrations Aid Casters

Vibration may be the key to casting fine-grained beryllium. Beryllium ingots, cast under vibration at 5-g acceleration and 60 cps, have relatively fine, equiaxed crystals. Interrupted vibration proves effective in grain refining aluminum. This method also shows promise for beryllium. Results appear in an Air-Force sponsored research report.

Improved Inventory

In a fresh approach to inventory problems, one company looks at all its production operations in three dimensions. These dimensions are vertical movement, storage and conveying. Materials handling comprises almost 90 pct of all plant operations, the company's engineers report. A flow concept and 3-D thinking allow a reduction in materials and parts storage. Even in automated lines, designers tend to think in terms of horizontal movement only. They neglect vertical potentials.

Tantalum-Alloy Base

The need for structural materials that resist heats above 2000°F has led to the consideration of tantalum as an alloy base. In spite of its high density, tantalum has several advantages. These include a very low ductile-to-brittle transition temperature, a refractory oxide and a high melting point. The most effective binary additions for improving tantalum's oxidation at 2000°F are titanium, zirconium and hafnium.

Pulsating Gas Burners

Two 15,500-lb capacity aluminum reverberatory furnaces use pulsating gas burners to save both gas and operating costs. Forced air feeds into these burners at 3 psi. A special refractory liner produces almost perfect combustion of the natural-gas fuel. One operator handles both new furnaces. Fuel savings range from 12-30 pct. Each burner releases 5.5-million Btu per cu ft of combustion volume.

Simplify Computer Use

Just announced is a major advance in computer technology. It's the first application of the new international language of mathematics (ALGOL). Computers will now be able to accept problems that are stated algebraically—instead of being first converted into complex machine language. A compiler does the translation. This reduces both programming time and the number of errors.

Emphasize Lightweight

In the new army, wheeled-vehicle design is aiming at extreme maneuverability and lightweight. Goal is that all equipment be floatable. The result is far greater use of aluminum and other lightweight materials in trucks, tanks and other ordnance vehicles. This trend shows up in all new equipment currently on display at the National Auto Show in Detroit.

Just a little

Vancoram Ferrovanadium does such a big job!

Vancoram Ferrovanadium does an outstanding job in a surprisingly economical way! In constructional steels, tool and die steels, deep-drawing steels, cast and forged steels, and in cast irons, no other alloying element is so versatile. It readily forms stable carbides and controls grain growth. In cast irons it is unusually effective in restraining graphitization. Vanadium imparts toughness, durability, strength and resistance to wear. Try it and see!

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Producers of alloys, metals and chemicals

Progress Report on

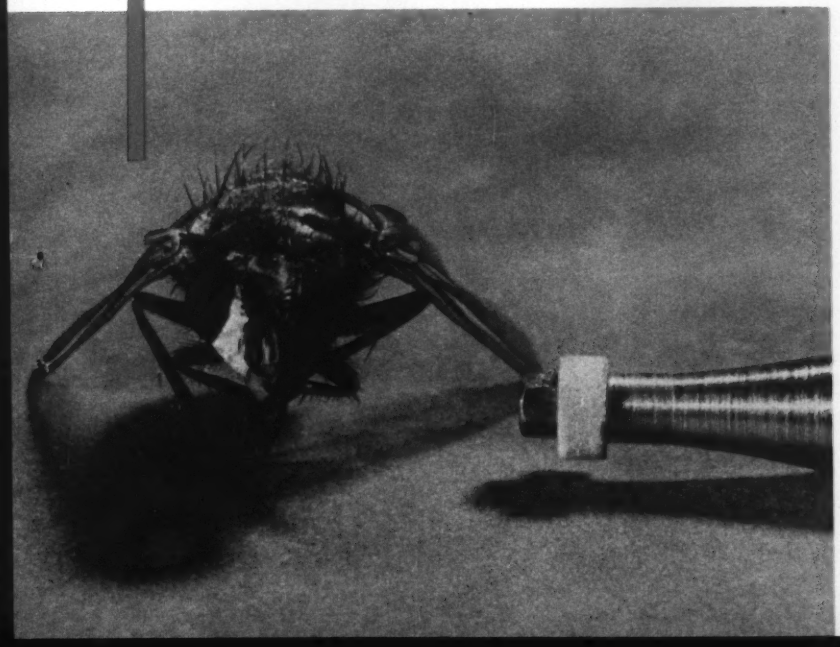
BAY STATE

BAY STATE ®

WHEELS of PROGRESS

Bay State Reports:

AN IMPORTANT ADVANCE IN MICRO-MINIATURIZATION

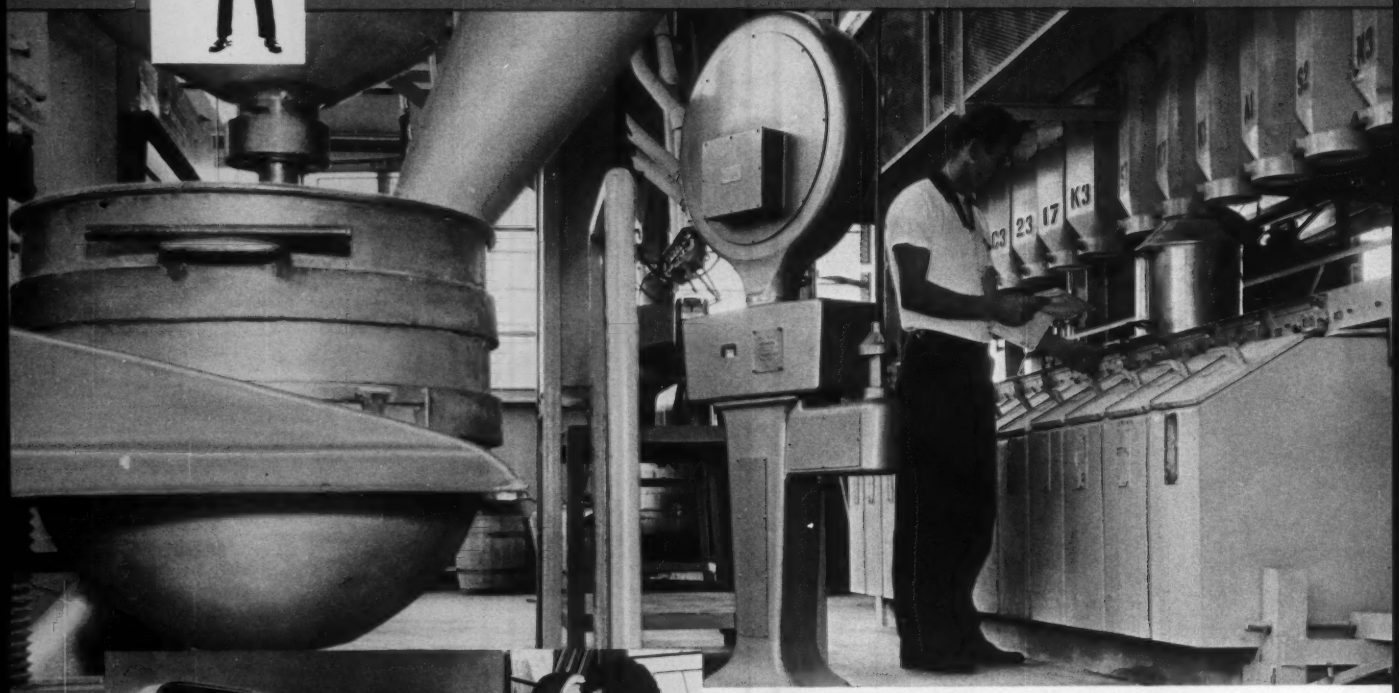


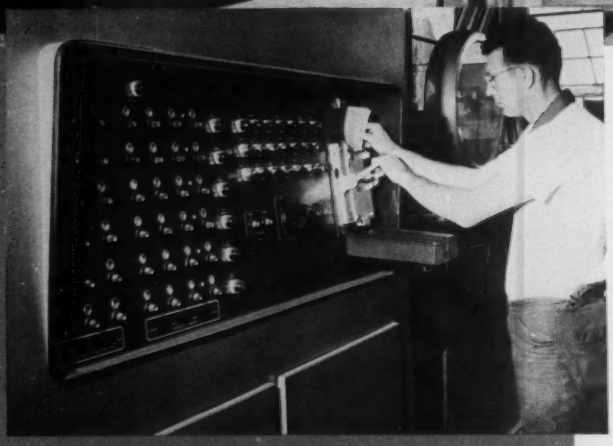
Tiny Grinding Wheels Developed for Delicate Tasks

Key feature in the development of this micro-miniature grinding wheel is its interchangeability. Previous ultra-small wheels had to be bonded permanently to a tool shaft. Bay State developed entirely new manufacturing techniques and produced true wheels which could withstand the strains set up when such a wheel is clamped to its shaft with a retaining nut. Special abrasive grit combinations were also developed to give superior finishes. In addition to substantially lower wheel costs, users have saved a considerable amount of set-up time during wheel changes in such operations as turning out micro-miniature ball-bearing races for high-speed cameras, tape recorders, missile guidance systems, etc.

On many larger diameter bores and races, Bay State's precision-mounted wheels, made in the conventional manner, continue in high demand due to their excellent performance.

Bay State Reports: OPTIMUM CONSISTENCY IN ABRASIVE PRODUCTS THROUGH INCREASED AUTOMATION



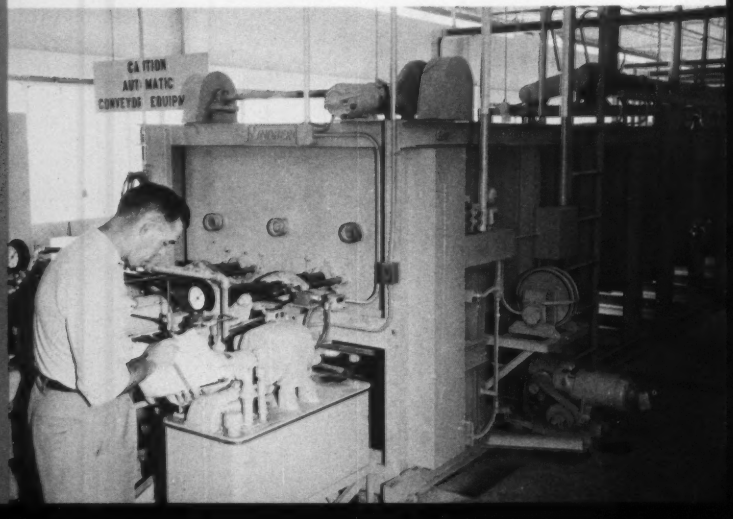


Automatic Weighing & Mixing

Weighing abrasive and bonding materials is a tricky business when it's done by hand. Yet consistent performance *depends* on accurate proportioning of all ingredients. That's why Bay State's ultra-modern automatic weighing and mixing equipment is such an important step forward in abrasive technology. Here, operator Richard Donovan (left) inserts a punched card in the control console which will make a completely automatic series of abrasive-grain weighing operations. Above, Donovan checks a bond-weighing cycle after setting it up on the console behind him. In the foreground is a high-speed mixer fed by chute from the automatic weighing equipment on the floor above. The accuracy and speed of this equipment enables Bay State to keep costs down and provide amazingly precise duplication of wheel specifications.

180 Feet of Controlled Super-Heat ▶

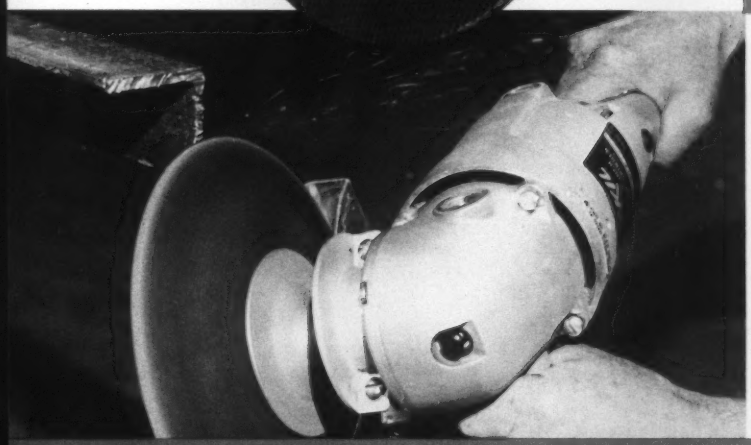
This is the ultimate in autofnatic kilns. Even the chemical composition of the atmosphere inside it is controlled by an exothermic gas generator which maintains exactly the atmosphere that best suits the formula of the honing stones and other abrasive products being fired. Electric heating elements provide constant, even heat (maximum is about 2350°F) without contaminating the atmosphere with unwanted by-products of combustion. Electronic controls are housed in a special air-conditioned room. Automatic feeding machinery delivers the abrasive products to powerful, hydraulic rams which give a 7000 lb. push and keep the production line moving through the kiln at a constant speed. Associate Laboratory Engineer Bill McMahon is shown here checking gauge readings.



Bay State Reports:

IMPROVED PERFORMANCE IN WELD-GRINDING THROUGH IMPROVED DESIGN

Bay State's new "Koolie Hat" portable grinding wheel cuts easier, safer and faster than any comparable wheel on the market. Its shape enables it to be held at a shallow (4° to 5°) angle so that operators work in a relaxed posture . . . are less prone to accidents caused by fatigue. The shape also ensures uniform wear on the periphery of the wheel so that thickness remains constant and only the wheel's diameter decreases . . . and the danger of shattering is virtually eliminated. Narrow radial contact area also ensures more uniformly high cutting speeds and prevents cracking due to heat build-up.



BAY STATE
WHEELS of PROGRESS

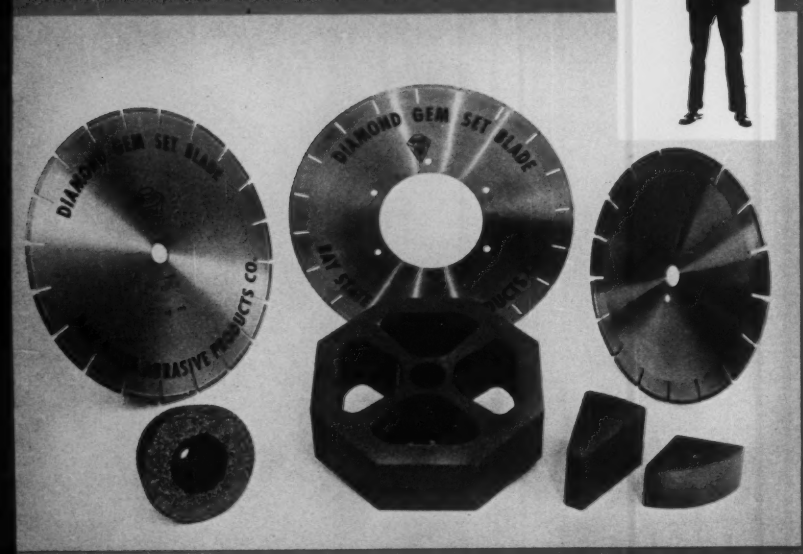
Bay State Reports: **BETTER SERVICE TO CUSTOMERS THROUGH PRE-PACKAGING**

Inventory control is greatly simplified for users and distributors, both, by pre-packaging of wheels in quantities that make logical units of supply for given types of grinding operations. Counting and handling time are reduced and such products as tool room, internal grinding, reinforced and mounted wheels can be supplied in their own protective packages. New packaging materials provide better protection than ever against dirt and breakage.

Bay State Reports:

ULTRA-THIN DICING AND WAFERING WHEELS FOR THE ELECTRONICS TRADE

These wheels are the real glamour queens of the abrasive industry. Their metal-bonded, diamond abrasive grit cuts through hard crystals of Quartz, Germanium and Silicon like a knife through well-aged cheddar. The wheels themselves are literally paper-thin (as thin as .006" to be exact!) so that they slice these valuable, electronic, semi-conductor materials with an absolute minimum of waste. Yet, these micro-thin blades are so rigid they cut with the utmost precision. Extra-deep diamond sections ensure maximum smoothness of finish and extra economy in terms of prolonged blade life. Bay State is now ideally situated to supply all of the great electronics manufacturing areas in the U. S.



Bay State Reports:

HIGH PERFORMANCE ABRASIVE PRODUCTS FOR THE STONE TRADE

There's nothing miniature about Bay State's diamond wheels for the stone trade. They're big, rugged brutes that slice through granite, marble, flagstone, quartzite and slate almost as easily as they do through sandstone, soapstone and the other softer minerals. Bay State also furnishes wheels and special shaped abrasive stones to fit all standard machines used for smoothing and finishing granite, marble and other types of stone. In each case Bay State develops the products for maximum cutting speed, precision and durability, resulting in the lowest cost per foot of cutting. Incidentally, with its greatly expanded diamond wheel facilities, Bay State is now one of the largest producers of diamond wheels in the abrasives industry.

BAY STATE
WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
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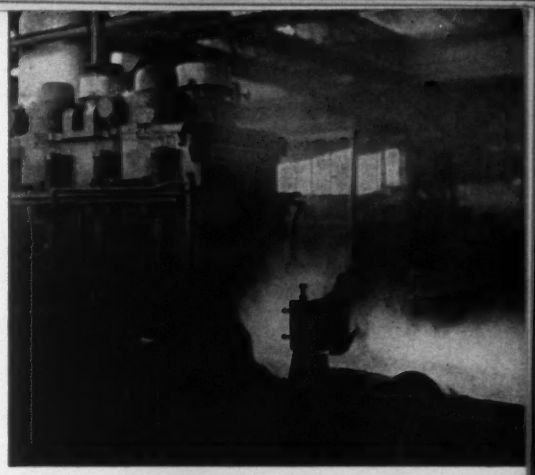
INNOCENTI

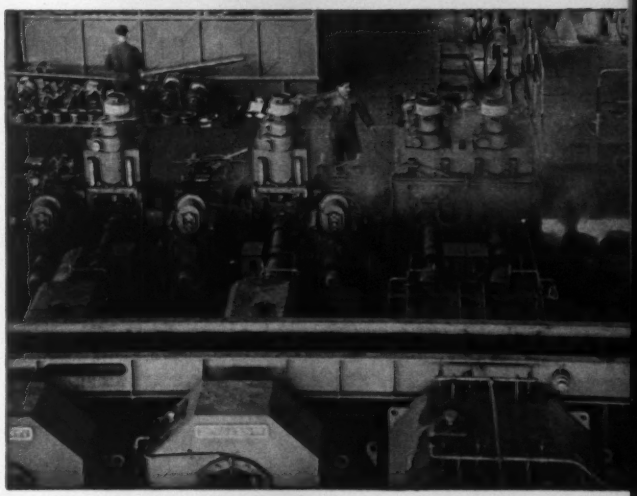
mechanical division

continuous mill

for the manufacture of seamless steel tubes and pipes

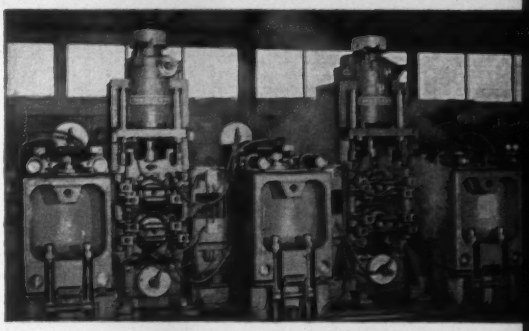


The Continuous Mill associated with the Stretch Reducing Mill in the double version for making tubes from $^{3}/_{8}$" to 3" and from $2.^{3}/_{8}$" to 7" successfully meets present requirements for consistently higher quality and quantity.



- Highest Capacity: the annual production can reach respectively 150,000 and 250,000 tons in the two versions.
- Highest yield: 93% - from billet to tube
- Complete automation: 1,5 man hour per produced ton
- Possibility to make tubes up to 18 mm with 2,25 mm minimum thickness without stretching
- Extremely easy to operate
- Low installation costs in respect of capacity.

These features make the Continuous Mill the most reliable tube making equipment for new installations or the modernization of the existing ones.



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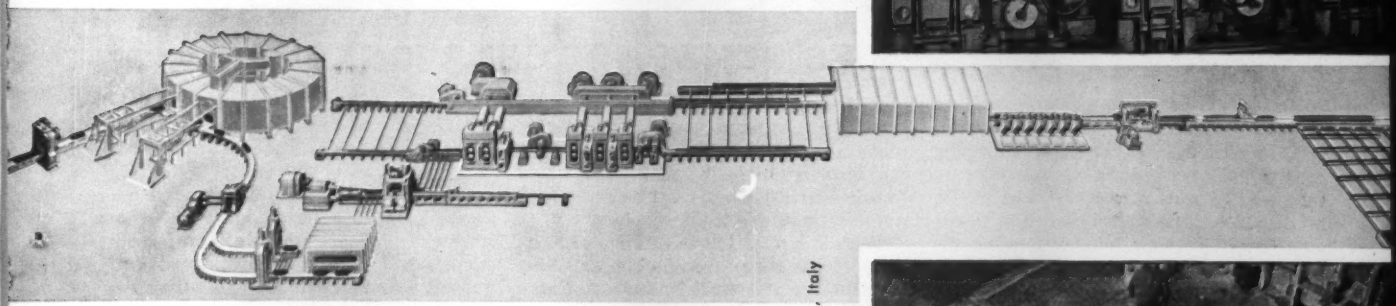

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Continuous Mill in operation at DALMINE S.p.A. works in Costa Volpino, Italy

PHOTOGRAPH BY BEN SPIEGEL

KIRBY THORNTON'S $1,489,486,655 WORKSHOP

Aluminum — want to make something of it? See Kirby Thornton. For you, he'll fashion the world's biggest forging on a 50,000-ton press that uses dies as long and as wide as a house trailer. Or he'll punch out extrusions a foot in diameter and five feet long with one cost-cutting stroke of an impact press . . . cast you an impeller whose gull-wing blades taper to a precise featheredge . . . roll you a sheet eight feet wide and a highway long.

But perhaps you'd like to roll your own. Kirby'll send you the finest aluminum ingots and plates to press, rods and bars to whittle, powders and pastes to mix—in any size, weight, strength or quantity you need.

Who is Kirby Thornton? He's chairman of the three-man committee that coordinates the world's largest light-metals workshop: *Alcoa*. If you've an idea, and it requires multiple facilities, Kirby knows where to go among Alcoa's 9 mines, 3 ore refining locations, 8 smelters, 6 research labs and 23 fabricating plants for the brains and tools to work it out and bring it in.

Because he knows his men and machines, because he knows more than one way and one place to do a job efficiently and economically, Kirby Thornton is an extra value you get with every pound of Alcoa® Aluminum you buy. Aluminum Company of America, 2018-K Alcoa Building, Pittsburgh 19, Pa.

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4. Service Inspectors to help solve production problems at your plant.

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6. Complete Line including all commercial forms, alloys, gages, tempers.

7. Availability via the nation's best stocked aluminum distributors.

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9. Trained Salesmen with a wealth of on-the-spot information.

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11. Year-Round Promotions expanding your old markets, building new ones.

12. The Alcoa Label, leading symbol of quality aluminum, to mark your goods.

Added Values With Alcoa Aluminum

ADDED VALUES

. . . is a case book of Alcoa special services and a guide to their availability in design, manufacture and sales. Your copy, with some of the most rewarding information you may ever read, is waiting and it's FREE. Write: Aluminum Company of America, 2018-K Alcoa Building, Pittsburgh 19, Pa.

FATIGUE CRACKS

The Uncommon Market

Europe by jet is no further from New York than San Francisco is by piston plane. If you were to hop over to England or the Continent you'd find there a great surge of interest in products made in the U. S. A.

You would also discover that U. S.-based companies are still expanding their interests in Europe, particularly in the "Six," the Common Market countries. A week after the Common Market went into effect, we brought you (The IRON AGE, Jan. 8, 1959) a piece of sound advice by W. F. Rockwell, Jr.: "Manufacture Overseas to Reach Europe's Expanding Market."

A Special Series—Other articles followed. Then, with the Common Market running more smoothly than its founders had hoped for, The IRON AGE next brought you a four-part series by David Rockefeller and other officials of the Chase Manhattan Bank (The IRON AGE, July 28 through Aug. 18, 1960).

Latest in this program of keeping U. S. metalworkers informed on Europe is the series by George F. Sullivan, editor of The IRON AGE, who recently returned from his sixth peacetime European tour. Perhaps you read last week's article, "Hard Sell at Hannover" on the German machine tool exhibition. This week's, p. 120, draws some parallels with the United States in the "twenties." More will follow.

Space Age Buying

Most purchasing agents at one time or another get called upon to place some odd orders. But purchasing agent Jack Benzie, of General Electric's Missile and Space Vehicle Div., Philadelphia, does it all the time.

Says Mr. Benzie, whose job it is to fill the requests of space age engineers, nothing can phase him now. In order to fill the needs of the scientists and engineers one must be prepared for the unusual at all times. And Mr. Benzie certainly has the advantage over other purchasing agents when it comes to the unusual.

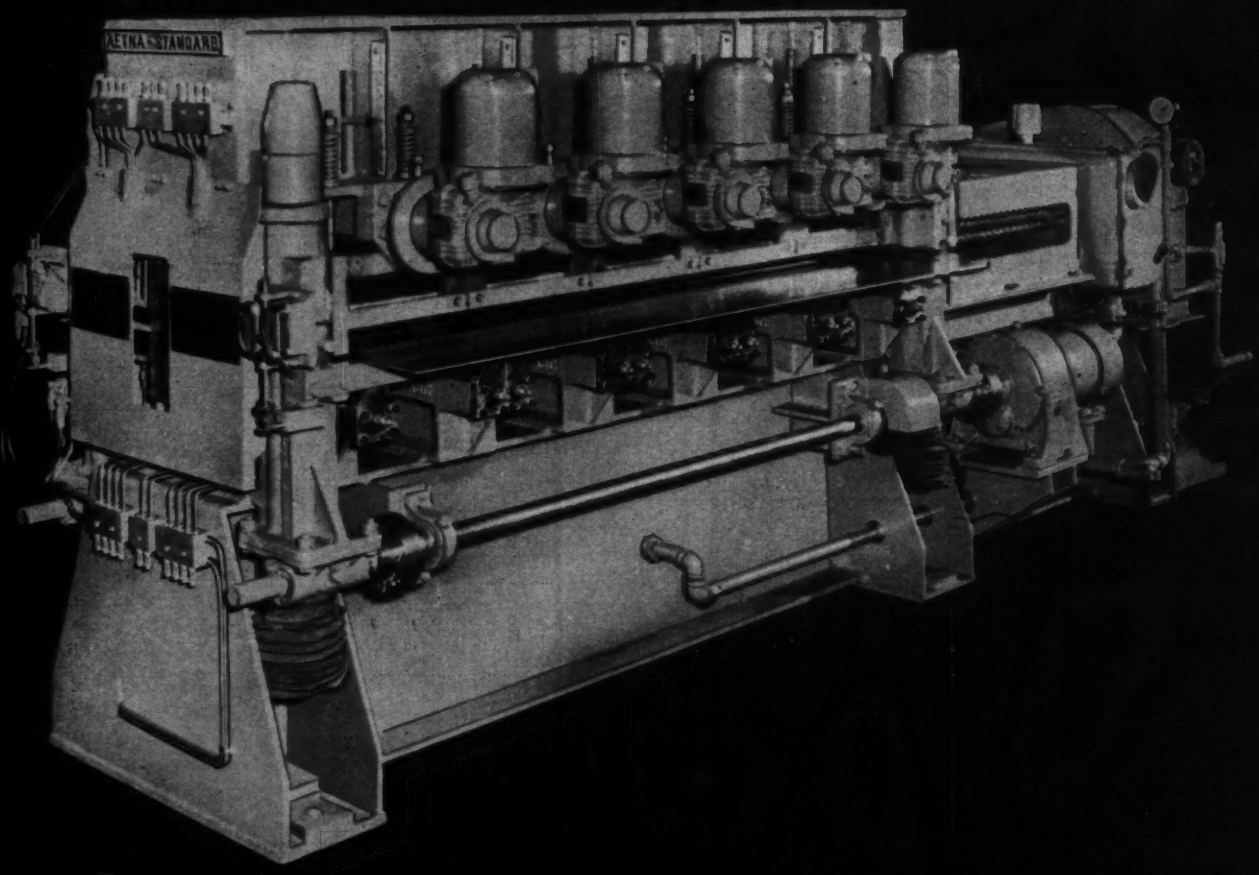
Menagerie—At times, it seems as though Mr. Benzie might qualify as a zookeeper. He has been asked to buy frogs, mice, and a monkey that will someday play a part in space exploration. And he admits that, at times, making these orders can get a bit confusing. For instance, one assistant came up with a problem over an order. He didn't know who was the frog buyer. When it was discovered who the frog buyer was, this man was looking for the monkey buyer.

Another variety item: Used baby diapers. Their lint-free quality makes them excellent wiping cloths for delicate instruments.

In the transportation end, Mr. Benzie has placed orders for cars, trailers, and buses. And among regular items are tons of paper, parachutes, explosives, and explosive liquids.

But to see what a space age purchasing agent does in the metalworking field, turn to p. 202.

"You can't leave, Cranston, you have a great future with Bigelow Industries."

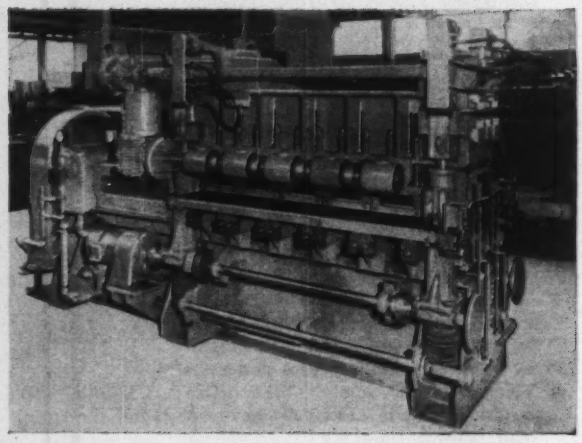


MORE WORK ON PRODUCT MADE POSSIBLE
WITH THIS

NEW ROLLER LEVELER

This new Roller Leveler, designed and manufactured by the Aetna-Standard Division of Blaw-Knox, has individual motor-operated back-up roll adjustments. The operator can easily make quick correction of product shape. The additional sets of back-up rolls make possible more flexibility of adjustment and more thorough working of the product. Motorized adjustments are also included for gauge thickness which make the unit fully equipped with power adjustments.

Leveler illustrated is 1¾" dia. x 72" face—21 rolls. Other sizes can be furnished to suit individual requirements. For detailed information on this new Roller Leveler or other Sheet and Strip Equipment, write: Aetna-Standard Division, Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.



AETNA-STANDARD MAKES MANY TYPES OF LEVELERS
These include 2 and 4 high Roller Levelers, Rectifier Levelers, Heavy Plate Levelers, Roller Levelers for tapered sheets.

Aetna-Standard Division
BLAW-KNOX

How Much Growth?

Sir—I really don't have time these days to sit down and write, but I was so interested in your editorial in the Metalworking Newsletter of The IRON AGE, Sept. 29, that I decided I was going to throw other things aside to say "amen."

I couldn't be more disgusted with this constant harping about percentage of growth, and, if Russia keeps growing at the rate it is, that it will overtake us by such-and-such a date. The type of dynamic growth that Russia is having is almost an inevitability when a country that has been a "have not" country becomes a "have" country. As the people get more of the material things of life and share in the growth (and I'm not sure this is happening to any great degree in Russia), a saturation point is reached and it is necessary to consolidate gains. During that time, there is a plateau rather than even a continual growth. Then the upswing starts once more, but on a much slower basis than the earlier one.

Why so many people refuse to look this in the face, I don't know, unless it is because they are more interested in the political implications of blindness than they are the statesmanlike approach of reality.—George F. Kohn, president, Precision Grinding Wheel Co., Philadelphia, Pa.

■ **The item referred to is Tom Campbell's editorial: "Our Future Growth: How Fast and How Much?" which appeared in The IRON AGE, Sept. 29, 1960.—Ed.**

Dissent

Sir—I was very surprised to read the insert on p. 121 of the Sept. 15 issue, "Are You Willing to Pay the Price?"

I do not know anything of Dr. Gaudet, but Stevens Institute, of course, has an excellent reputation. The statement made in No. 1 and No. 2 may apply to some people, but they certainly don't apply to the executives I am familiar with on the average. The statement made in No. 6 obviously is not thought through, because one can continue to keep old friends while making new ones. The remarks in No. 7 and No. 8 are certainly a discredit to American industry, if true, and I know you don't believe it, and heaven knows I don't. I care mighty little for the man who succeeded by using others and I care much less, as I know you do, for anyone who will literally put his job ahead of his family.

If Dr. Gaudet's implied picture of the American executive is correct, it is a pretty sorry commentary of our time.—William B. Kles, Jr., Warren, O.

Compliments

Sir — May I compliment The IRON AGE on the Sept. 15 article covering SKF Industries' "Distributor-Aid Plan." The subject was both concisely and comprehensively handled, and reaction to the plan has been uniformly excellent. The IRON AGE can certainly point to prompt reader response. — T. A. Fitzgerald, SKF Industries, Inc., Philadelphia, Pa.

"I've spent five contented years here—Not bad out of a total of thirty."

THIS IS THE WAY WE

"Qualify for Quality"

BE A PIONEER: Be sure TMI methods pace the technological advance of the metalworking industry. Never get caught in a "trying to catch up" position when serving quality-minded customers.

CHOOSE EXPERIENCE WISELY: In men, equipment and methods . . . be highly selective. Have the planning courage and the long range strength to accumulate quality experience and reject good-enough practices.

THINK FIRST of our customers. As we increase the quality of our customers' products, we insure the ability of our own trademark to grow in its quality stature

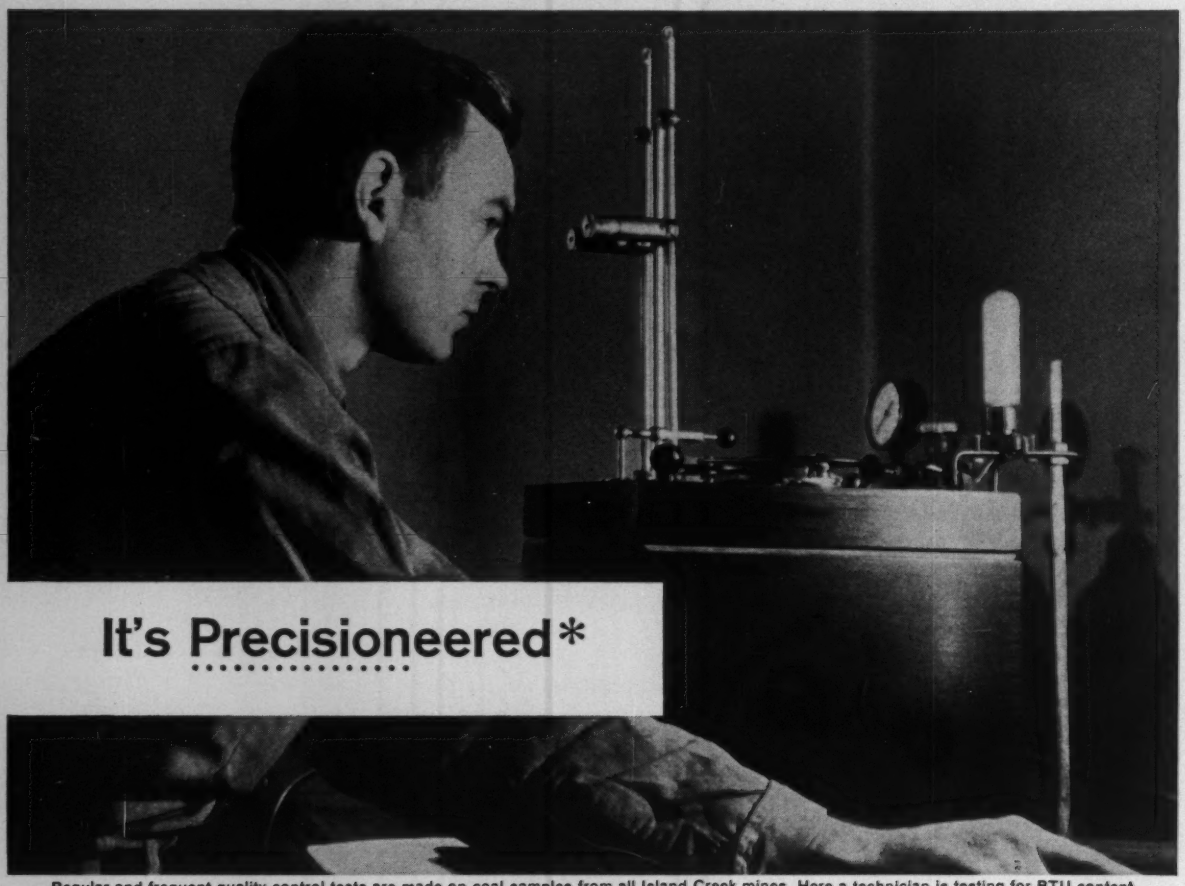
NEVER COMPROMISE quality standards nor dare to assume that those standards are static. Our success in the cold drawing of small diameter stainless and exotic alloy tubing depends on our ability to lead in the quality field.

✓WHEN YOUR KEY PEOPLE RECOMMEND TMI TUBING THESE RULES FOR QUALITY WORK FOR YOU FULL TIME.

TUBE METHODS INC.
METALLURGISTS • ENGINEERS • MANUFACTURERS
BRIDGEPORT (Montgomery County), PA.

Stainless and special alloys .030" to 1.250" O.D. drawn as close as .0005"

How is it possible for Island Creek coal to lower the cost per 1000 pounds of steam?...



It's Precisioneered*

Regular and frequent quality control tests are made on coal samples from all Island Creek mines. Here a technician is testing for BTU content.

* PRECISIONEERING is a chain of controlled events that actually begins and ends at your burning equipment. It starts with the question: What kind of coal does your equipment require to produce steam at the lowest net cost per 1000 lbs.? It provides the answer, through penetrating engineering and evaluation studies. It produces the answer . . . with superior seams of coal prepared exactly to your determined specifications in modern preparation plants, using precision engineering techniques and strictest laboratory controls. We'd welcome a chance to discuss the possible reduction of your net costs through Precisioneering. Write. Or phone. No obligation, of course.

P.S. TO COKING COAL BUYERS
Island Creek Precisioneered Coking Coals can help you produce more hot metal per square foot of hearth area.

ISLAND CREEK
Precisioneered Coal

You can depend on Island Creek . . . a career company dedicated to coal

Island Creek Coal Sales Company, Chafin Building, Huntington 18, West Virginia • Chicago • Cincinnati • Cleveland • Detroit • Greensboro • New York • Pittsburgh

COMING EXHIBITS

MHI Central States Show—Nov. 1-3, Kentucky Fair and Exposition Center, Louisville, Ky. (The Material Handling Institute, One Gateway Center, Pittsburgh.)

Die Casting Exposition & Congress—Nov. 8-11, Detroit Armory, Armory, Detroit. (The Society of Die Casting Engineers, 19382 James Couzens Highway, Detroit 35.)

Western Tool Show—Nov. 14-18, Memorial Sports Arena, Los Angeles. (American Society of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38.)

Power and Mechanical Engineering Show—Nov. 28-Dec. 2, Coliseum, New York. (American Society of Mechanical Engineers, 29 W. 39th St., New York 17.)

MEETINGS

OCTOBER

Conveyor Equipment Mfrs. Assn.—Annual meeting, Oct. 22-25, The Greenbrier, White Sulphur Springs, W. Va., Association headquarters, One Thomas Circle, Washington, D. C.

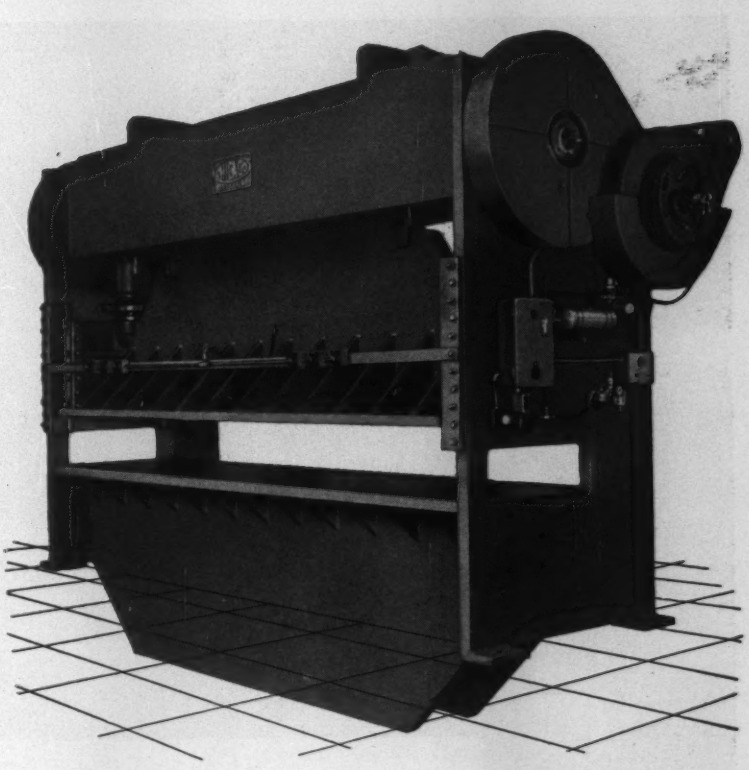
Truck Body & Equipment Assn., Inc.—Annual convention, Oct. 24-26, Hotel Sherman, Chicago. Association headquarters, 1616 K St., N. W., Washington 6, D. C.

American Gear Mfrs. Assn.—Semi-annual meeting, Oct. 24-26, Edgewater Beach Hotel, Chicago. Association headquarters, One Thomas Circle, Washington 5, D. C.

Assn. of Consulting Chemists & Chemical Engineers, Inc.—Annual meeting, Oct. 25, Hotel Shelburne, New York. Association headquarters, 50 E. 41st St., New York.

American Standards Assn., Inc.—National conference on standards, Oct. 25 - 27, Sheraton - McAlpin Hotel, New York. Association headquarters, 70 E. 45th St., New York.

The Galvanizers Committee, American Zinc Institute—Meeting, Oct. 27-28, Onesto Hotel, Canton, O.



CHICAGO DREIS & KRUMP

PRESSES
STRAIGHT-SIDE TYPE

large die area
capacities up to 400 tons

This is a typical model of CHICAGO straight-side-type presses used for multiple punching, notching, and trimming operations. This press with a die area of 48 inches by 198 inches has a capacity of 200 tons.

Complete recommendations for any job on request.

CHICAGO DREIS & KRUMP

Press Brakes • Straight-Side-Type Presses • Press Brake Dies
Hand and Power Bending Brakes • Special Metal-Forming Machines

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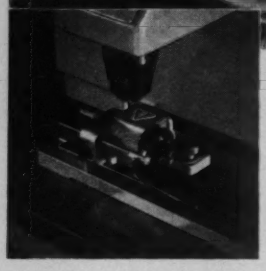

Measure SPECIALS Easily with This New Universal Staging Fixture

Cut set-up problems in measuring small parts, cylindrical pieces, odd shapes. There's a new Universal Staging Fixture to position just about *any* part up to 3 inches in length. Mount the part and see the sharp image on the distortion-free 10-inch screen. Get micrometer readings to .001". So easy unskilled help can learn it in less than half a day. Other big savings, too . . . extremely low purchase price, *plus* almost unlimited versatility. With your choice of understage and surface illumination, and the new Universal Staging Fixtures, you can just about write off special jigs and fixtures as a cost factor.

Find out more about how B&L can simplify your precision inspection. There's a complete line of instruments to help you. Mail the coupon now.

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- ☐ Toolmakers' Microscope
- ☐ StereoZoom Microscopes, D-15
- ☐ Scratch Depth Gage, D-2004
- ☐ Optical Aids, D-1059

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COMPANY .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

BAUSCH & LOMB
SINCE B&L 1853

MEETINGS

Institute headquarters, 292 Madison Ave., New York 17, N. Y.

The American Society of Industrial Designers—Annual conference, Oct. 27-28, Edgewater Beach Hotel, Chicago. Society headquarters, 15 E. 48th St., New York 17, N. Y.

The Assn. of American Battery Mfrs., Inc.—Fall convention, Oct. 27-29, The Palmer House, Chicago. Association headquarters, 19 N. Harrison St., E. Orange, N. J.

National Fluid Power Assn.—Fall meetin, Oct.30-Nov. 2. The Edgewater Beach Hotel, Chicago, Association headquarters, 5595 N. Hollywood Ave., Milwaukee.

American Institute of Steel Construction, Inc.—Annual convention, Oct. 30-Nov. 3, Greenbrier, White Sulphur Springs, W.Va. Institute headquarters, 101 Park Ave., New York, N. Y.

NOVEMBER

Porcelain Enamel Institute, Inc.—Shop practice forum, Nov. 2-4, University of Illinois, Urbana, Ill. Institute headquarters, 1145 19th St., N. W., Washington, D. C.

National Machine Tool Builders Assn.—Annual meeting, Nov. 2-4, The Homestead, Hot Springs, Va. Association headquarters, 2139 Wisconsin Ave., N. W., Washington, D. C.

American Production & Inventory Control Society — Annual national conference and technical exhibit, Nov. 3-4, Sheraton-Cadillac Hotel, Detroit. Society headquarters, 330 South Wells St., Chicago 6, Ill.

The Anti-Friction Bearing Manufacturers Assn., Inc. — Fall meeting, Nov. 3-5, Hollywood Beach Hotel, Hollywood Beach, Fla. Association headquarters, 60 E. 42nd St., New York.

Society of Plastic Engineers, Inc.—Regional technical conference on automation in injection and compression molding, Nov. 7, King Edward Sheraton Hotel, Toronto, Ontario, Canada. Society headquarters, 65 Prospect St., Stamford, Conn.

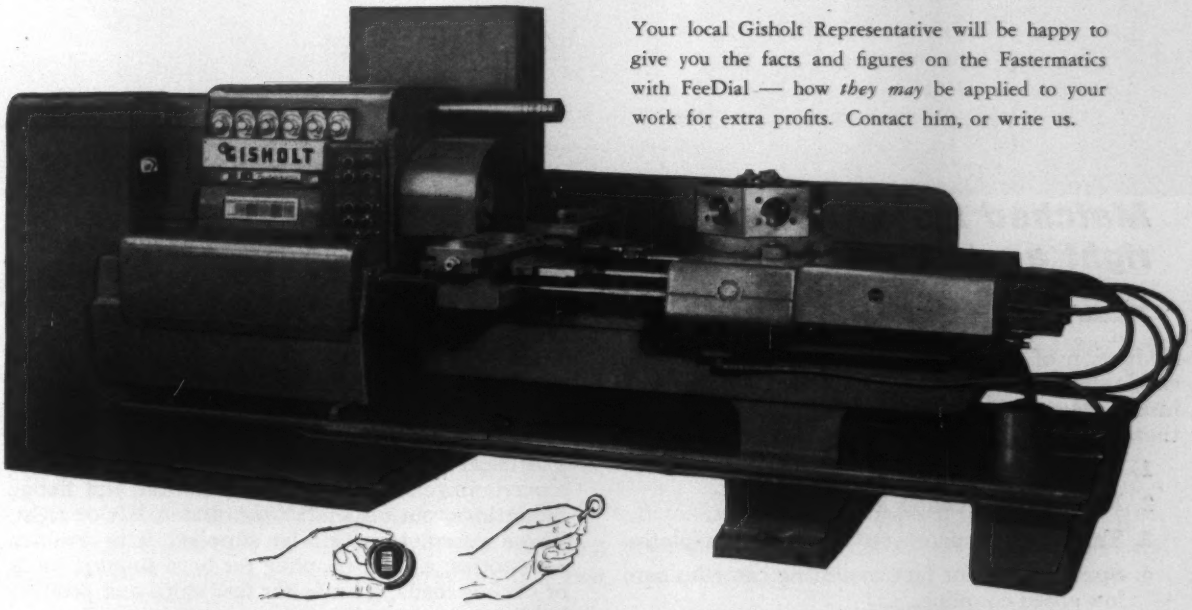
How Gisholt Fastermatics turn 90% of setup time into profitable production

Saves nearly four hours in just one setup — that's how the new 1960 Gisholt Fastermatic® Automatic Chucking Turret Lathe with FeeDial compares with the models produced only ten years ago.

Here's the record for the three models produced since 1950:			
	1950 Model	1955 Model	1960 Model
Time for spindle speeds, 6 stations	10 Min.	1 Min.	1 Min.
Time for feed rates, 6 stations	36 Min.	30 Min.	5 Min.
Time for setting traverse trips	54 Min.	18 Min.	9 Min.
Time for turret positioning	130 Min.	45 Min.	15 Min.
Total time	250 Min.	94 Min.	30 Min.

Multiply the savings shown above by the number of setups you do in your shop in one week, in four weeks . . . in one year. You'll quickly see extra profits you may now be losing with an outmoded lathe, regardless of make. That is the price of obsolescence!

Your local Gisholt Representative will be happy to give you the facts and figures on the Fastermatics with FeeDial — how *they may* be applied to your work for extra profits. Contact him, or write us.



FeeDial® and selector switches slash setup time for Automatic Chucking Turret Lathe

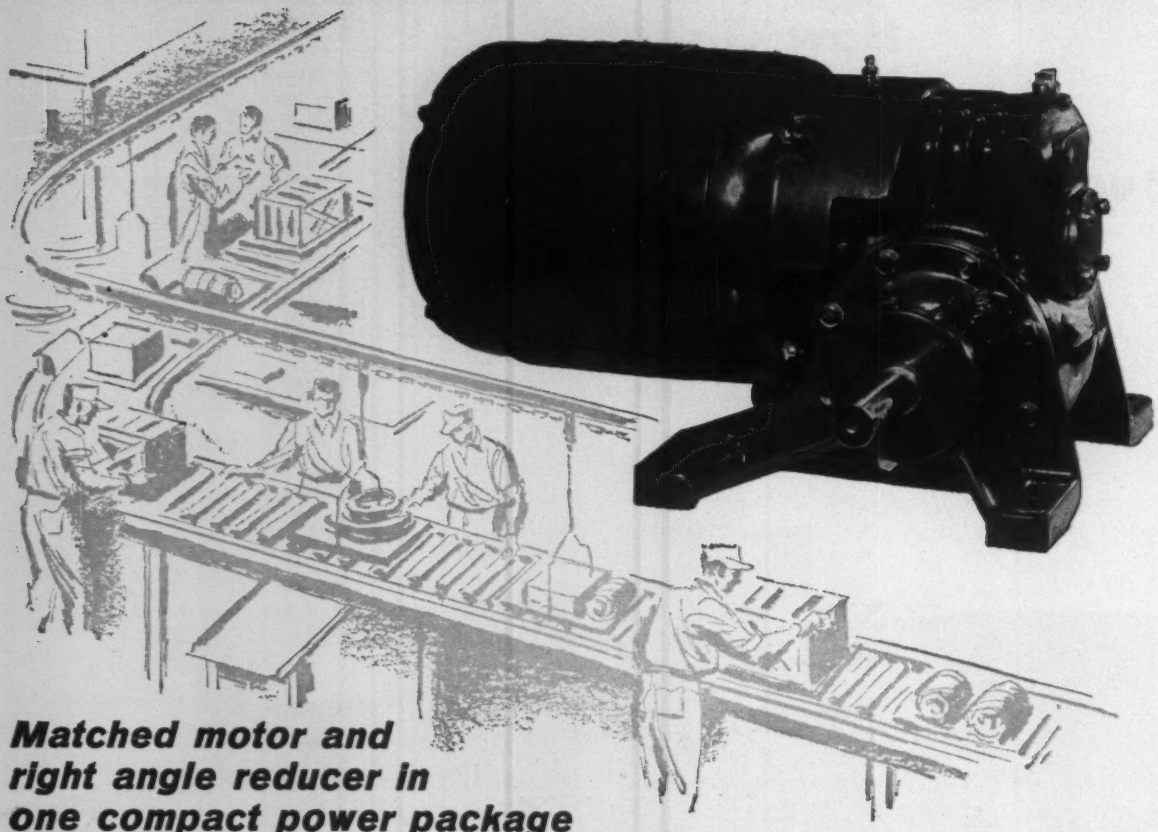
—lets you set individual feed rates for all six turret stations in just five minutes or less. You simply turn the dials, and that's it. And by flicking switches you can set spindle speeds and functions in only five minutes more. With such new setup speed, the new Fastermatic brings cost-cutting automatic production to a greater range of small-lot jobs than ever before.

Turret Lathes • Automatic Lathes
Balancers • Superfinishers®
Threading Lathes • Factory-Rebuilt
Machines with New-Machine Guarantee

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

MASTER GEARMOTORS

simplify applications—save space



Matched motor and right angle reducer in one compact power package

Reduction of engineering and assembly cost . . . elimination of separate components . . . are basic in this Master Right Angle Gearmotor. Consider these specific advantages:

1. No high speed coupling.
2. No V-belts or chains and sprockets.
3. Takes up less space—reduces mounting plates.
4. Special flange or face mounting can eliminate low speed coupling.
5. Saves aisle space . . . drives around the corner.
6. Wide acceptance by machine builder and user.

Master Gearmotors are built with ratings from ⅛ to 125 h.p. . . . in right angle, parallel or in combination. Right angle ratios are available to 96:1; parallel 120:1.

Electrical and mechanical modifications give you a maximum choice—vertical, horizontal, and flange mountings; output shaft over, under, left or right. These gearmotors can be supplied with built-in accessories: a fluid coupling for hard-to-start loads or cycling loads; a brake for fast stops and positive holding.

Call your nearest Reliance Sales Engineer. Let him tell you why more Master Gearmotors are in use today than any other make.

E-1648

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

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DEPT. 210A, CLEVELAND 17, OHIO

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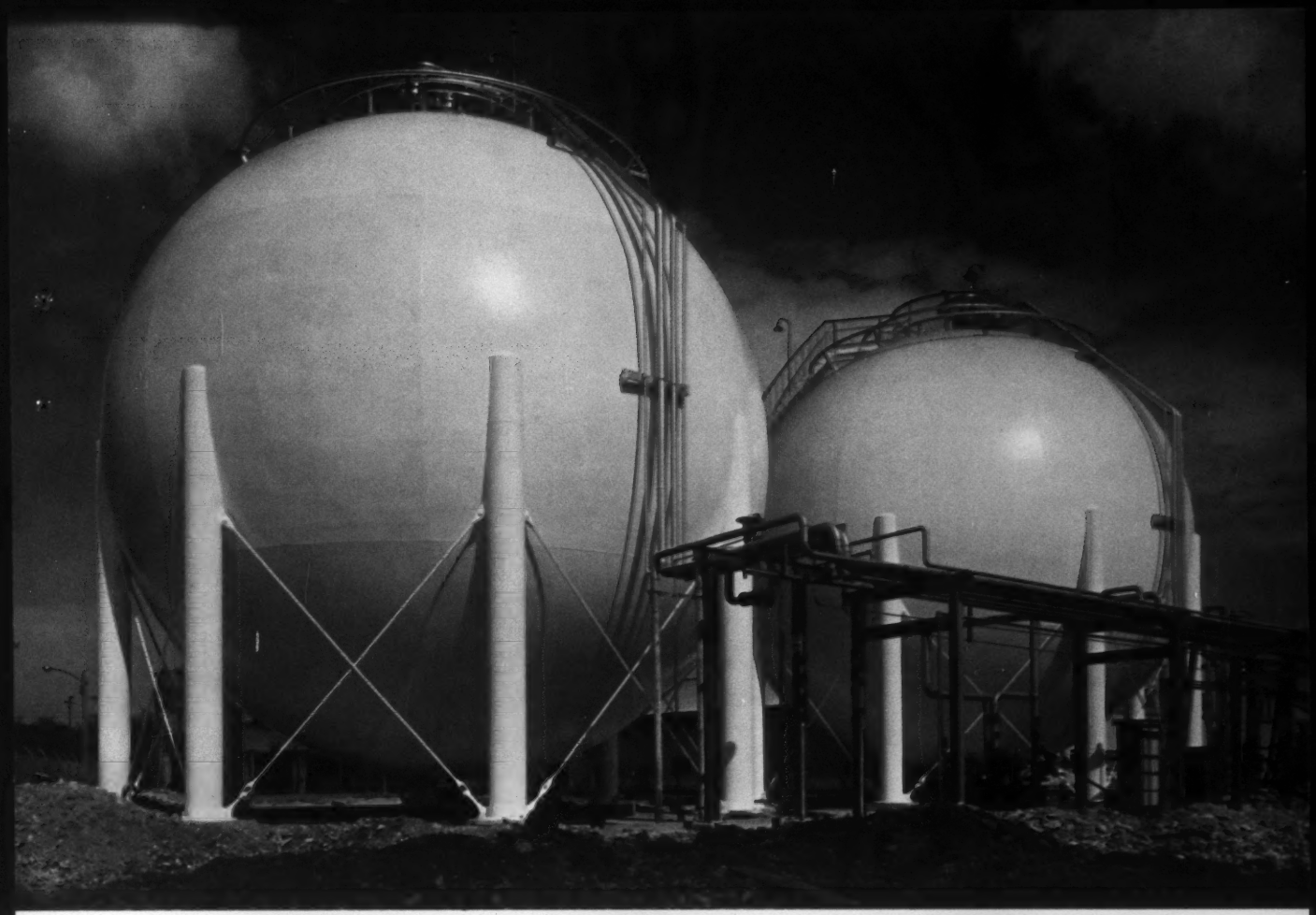
Duty Master A-c. Motors, Master Gearmotors, Reeves Drives, V★S Drives, Super 'T' D-c. Motors, Generators, Controls and Engineered Drive Systems.



Hortonspheres built of USS "T-1" Steel for Compania Cubana Del Nitrogeno, S. A., Matanzas, Cuba. Designed, fabricated and erected by Chicago Bridge & Iron Company.

Weight cut 50%

In USS "T-1" Steel pressure vessels. Each of these two Hortonspheres in Matanzas, Cuba, has a capacity of 8,750 barrels of anhydrous ammonia. They are 45.5 feet in diameter and each shell weighs about 311,350 pounds. By designing them with USS "T-1" Constructional Alloy Steel, to an allowable working stress of 32,400 psi, the plate thicknesses were reduced to 1.109 inches and 1.075 inches. This is about 50% less than if A212-Grade B fire box quality steel had been used.

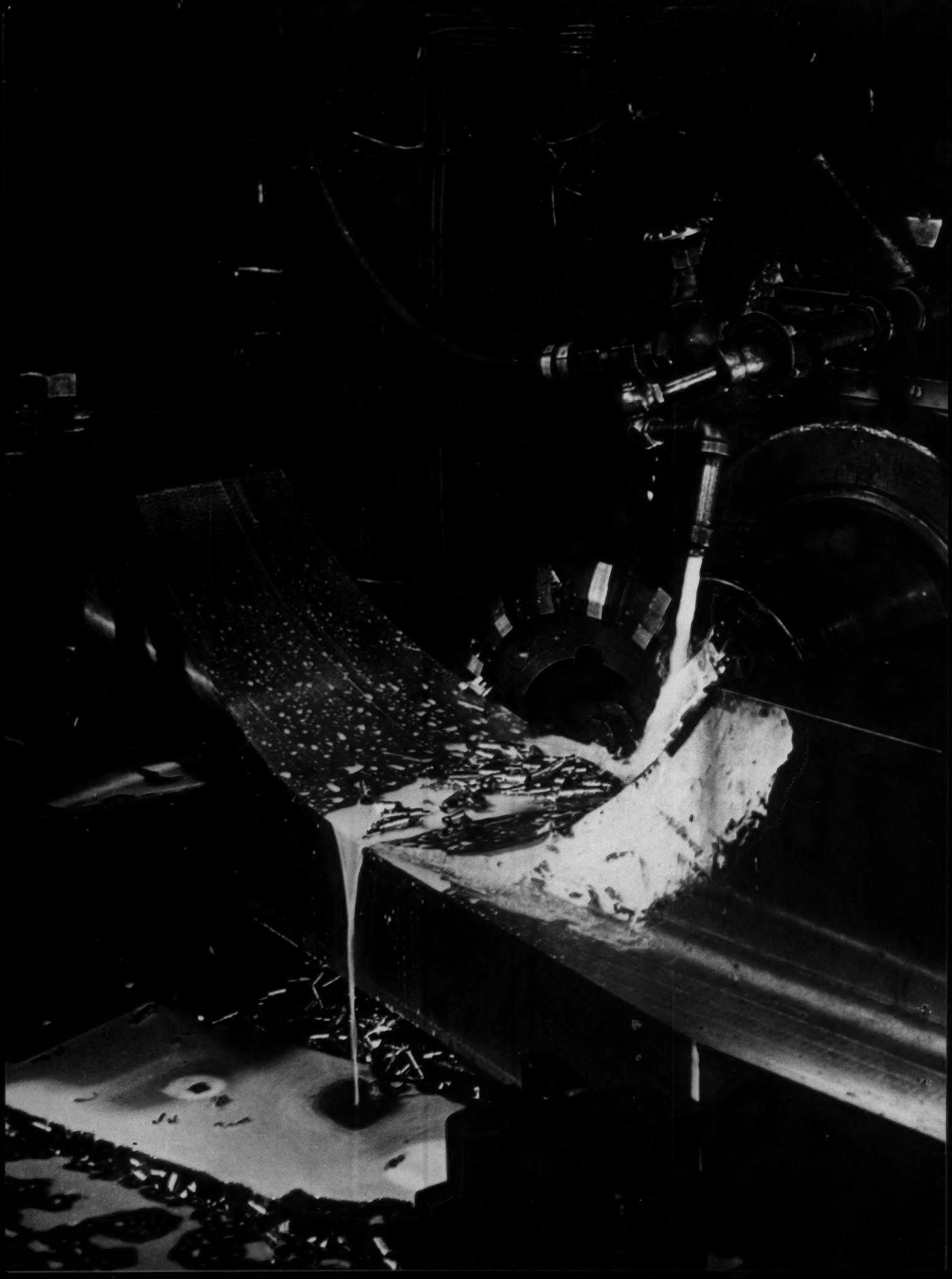
Result: Only 363 tons of USS "T-1" Steel were needed for both tanks, reducing by one-half the amount of steel that would otherwise have been required. Freight, handling, welding and erection costs were less—and the user got a stronger, tougher vessel with an overall saving in cost.

Fabrication steps: Plates of USS "T-1" Steel in widths of 78 inches and 115 inches and lengths up to 19 feet 2-½ inches were shaped cold and field stress relieved. Column plates and some shell plates were stress relieved in the shop. Electrodes used in field welding were low hydrogen type of the E110 strength level and all field welds were 100% radiographed. With a minimum yield strength of 100,000 psi, plus toughness, weldability, and high resistance to impact abrasion, USS "T-1" Steel is ideally suited for many applications throughout industry. Write for our latest booklet. United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS and "T-1" are registered trademarks
Hortonsphere is a registered trademark of Chicago Bridge & Iron Company

This mark tells you a product is made of modern Steel

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
National Tube—Pittsburgh
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company
United States Steel



This forging may cradle the greatest source of energy on earth

One of the great scientific investigations of all time is now in progress, as we strive for a controlled *fusion* reaction. If we succeed, man will be able to generate a limitless amount of energy using deuterium fuel, a hydrogen isotope, available in inexhaustible quantities from the sea.

Princeton University carries on the study with their Stellarator-type experimental devices. The Model-C Stellarator Facility now nearing completion will cost $35 million and consists of an 8-inch-diameter, 40-foot-long, racetrack-shaped tube to control the reaction. Required ignition temperature is in the order of 100 *million* degrees. Any solid material will evaporate at that temperature, so the hot ionized gas will be confined in a magnetic field of *50,000* gauss in the Model-C Stellarator. The equipment is supported by USS Quality Forgings of Type 305 Stainless Steel.

Altogether, U. S. Steel supplied 17 of these stainless steel forgings, fully annealed, to Allis-Chalmers Manufacturing Company, major contractor for the new Model-C Stellarator.

The steel for the forgings was forged, heat-treated and machined at U. S. Steel's Homestead Plant. Each forging measures 60¼″ long, 21¼″ wide at the base, 15⅜″ high and weighs about 2,450 pounds rough machined.

United States Steel makes many forgings for the nuclear industry. Here, a team of *experts* supervises and *controls every step* of forging production. This same team can handle your forging requirements. If you would like additional information about USS Quality Forgings, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Export Company

United States Steel

USS

Have you sent for this FREE book and calculator?

Here is a new book, written in simple language, that describes the "Do's" and "Don'ts" in welding USS "T-1" Steel. Included in the booklet is a handy heat input circular computer that helps you choose the proper welding machine settings. Both will help every welder to do a more reliable job and make his work easier.

USS "T-1" Steel has become famous for three properties not usually found in a single steel: very high yield strength, excellent toughness and good weldability. The booklet will tell you how to weld "T-1" Steel successfully without affecting either its strength or toughness.

The information is based on the experience of our many field service men whose jobs are to help customers fabricate "T-1" Steel. It contains the results of nine years of work with hundreds of users, and shows how to apply common practices in the welding of "T-1" Steel.

As the booklet points out, welding of USS "T-1" Steel is not particularly difficult—but it is different than welding most other high-strength structural steels. To do it correctly requires some basic knowledge of the metal, of the electrodes, and the proper welding procedures.

We'll gladly send you enough free copies of the booklet for your weld shop personnel. Just send the coupon.

USS and "T-1" are registered trademarks

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Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
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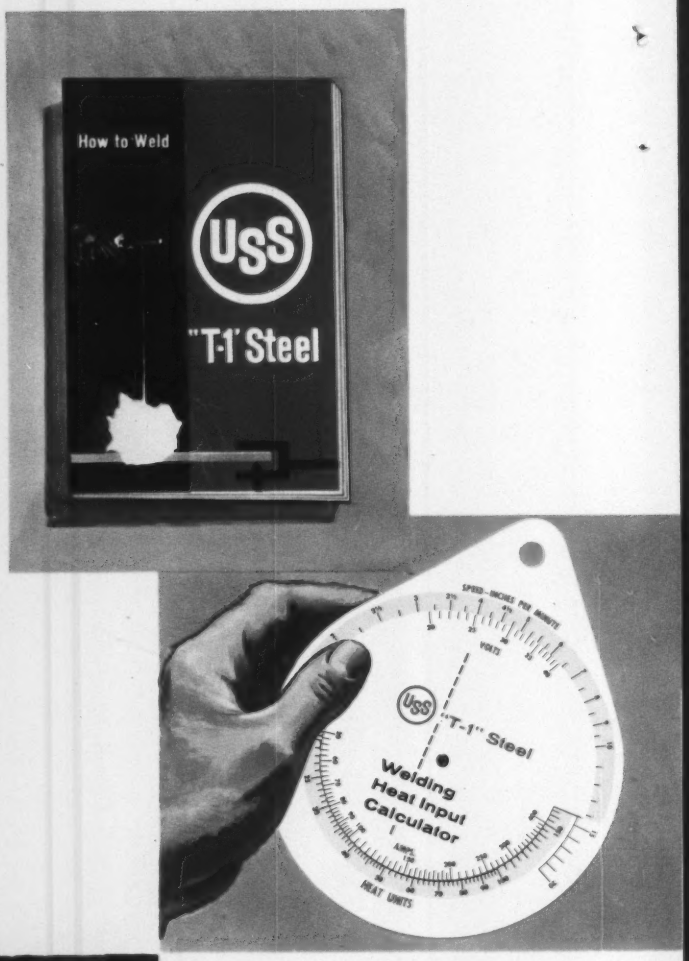


United States Steel
525 William Penn Place, Room 6160
Pittsburgh 30, Pa.

Gentlemen:

Please send me_____ copies of your new 24-page booklet, "How to Weld USS 'T-1' Steel," including the handy heat input calculator.

Name_____

Title_____

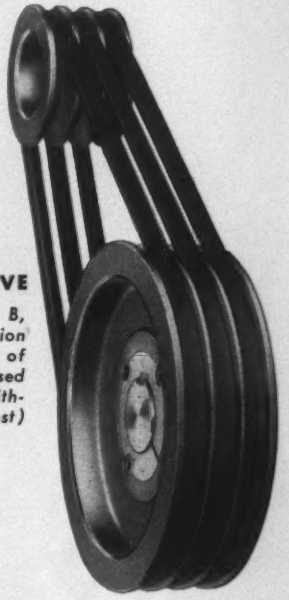
Address_____

Company_____

City_____ Zone____ State_____

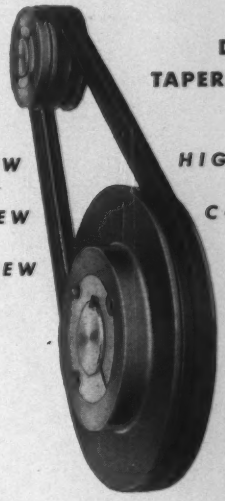
an entirely new line of
V-Belt Drives.....

DODGE Dyna V



BIG-GROOVE TAPER-LOCK DRIVE

(— using standard A, B, C, D and E cross section belts, the hp ratings of which have been increased an average of 40% without any increase in cost)



DYNA-V TAPER-LOCK DRIVE

NEW HIGH CAPACITY
NEW COMPACTNESS
NEW SAVINGS IN COST

COMPARISON, ILLUSTRATED ABOVE — 3 HP, 1750 RPM, 2.41 TO 1 RATIO

	BELTS		SHEAVES			CENTER DISTANCE	HP	WEIGHT (LBS.)	COST	
	Number	Size	O.D. Driver	O.D. Driven	Width				Per hp	Per Drive
BIG-GROOVE TAPER-LOCK DRIVE	3	A42	4.15"	8.95"	2½"	12.3"	4.62	24.7	$5.62	$25.98
DYNA-V TAPER-LOCK DRIVE	2	3V400	3.35"	8.00"	1 3/32"	10.8"	5.0	18.0	$4.50	$22.50
% SAVING *Savings vary with different sized drives*			19%	10%	56%	12%	+	27%	19.9%	13.4%

Dyna-V Drives are sensationally compact. They are capable of handling up to three times as much horsepower in a given space. Dyna-V opens vast new possibilities for better, more economical machine design. And, in most instances, *Dyna-V costs less!*

Narrower grooves, to match stronger, narrower Dyna-V Belts, greatly reduce the face width and the weight of Dyna-V Sheaves. Cost is lowered. Smaller diameter sheaves and shorter center distances multiply savings.

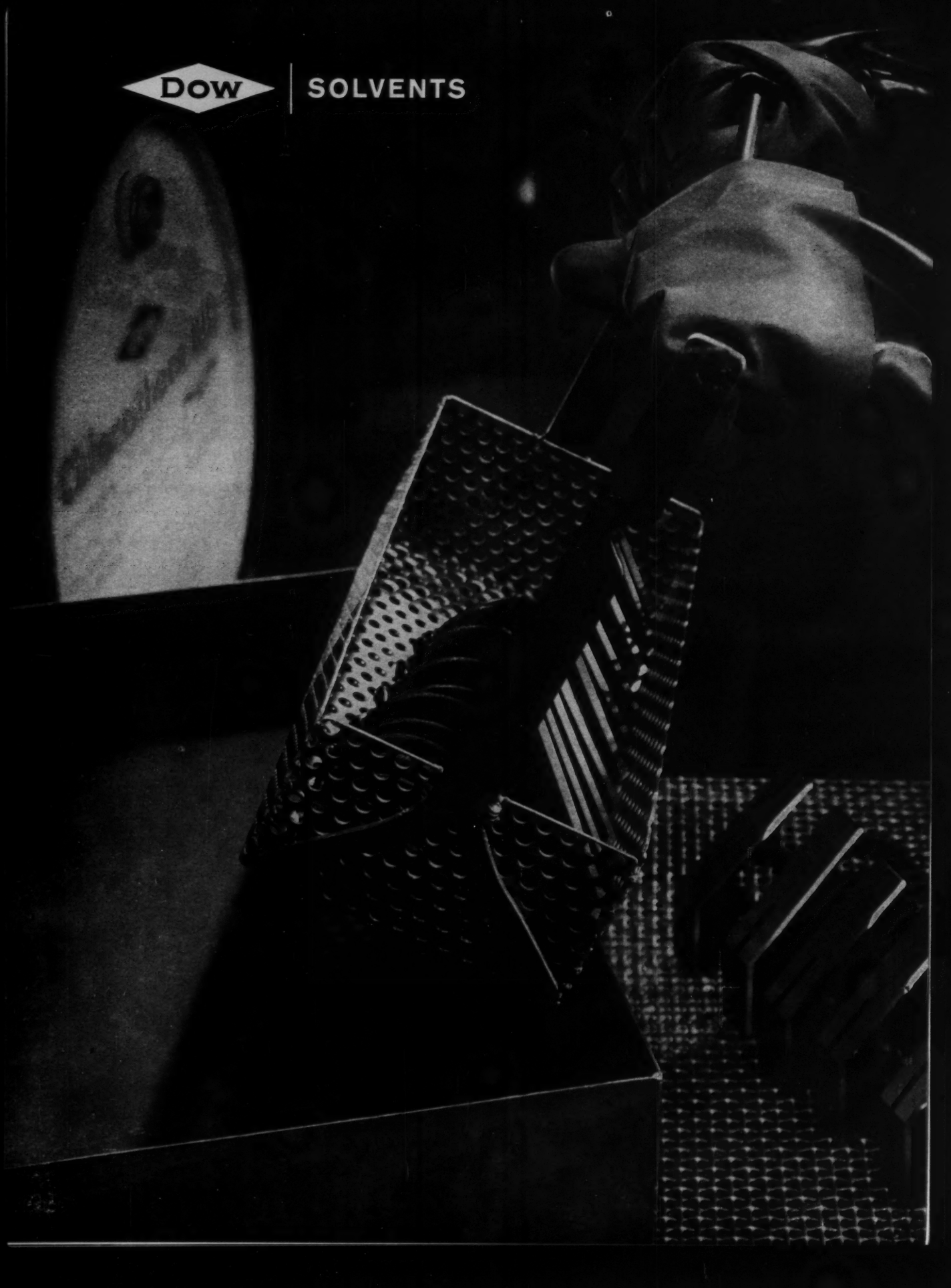
Dyna-V Sheaves decrease shaft overhang—increase bearing life. The new dimensional stability of Dyna-V Belts solves the problem of belt matching. Every belt carries its full share of the load.

Dyna-V Drives are available for capacities from 1 to 1500 hp. Ask your Dodge Distributor. Or write us for new Dyna-V Bulletin.

DODGE MANUFACTURING CORPORATION, 800 Union St., Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery".


DOW
SOLVENTS

ANNOUNCING...

Chlorothene NU

New stabilizer system solves corrosion problems—makes recovery easy!

Newly developed Chlorothene® NU combines high solvency and safety with an advanced stabilizer system that makes possible an extraordinary range of cold-cleaning applications – makes recovery easy, too!

The exceptional stability of Chlorothene NU (specially inhibited 1,1,1-trichloroethane) practically eliminates corrosion of sensitive metals. You can use it for cleaning aluminum, zinc, and white-metal alloys–as well as other metals, many plastics, rubber products and other materials.

Because increased stability makes recovery easy and practical, you can enjoy the economy of using Chlorothene NU over and over again. In most cases, existing equipment, such as a trichloroethylene still, does an excellent job.

Safe two ways! Low in toxicity, Chlorothene NU has a maximum allowable vapor concentration of 500 parts per million. That's closely comparable to many flammable solvents and is substantially more favorable than most chlorinated solvents. In addition, Chlorothene NU has no fire or flash point, as measured by standard methods. These features not only make Chlorothene NU safer to use–they simplify new cleaning systems and waste disposal.

COLOR CODED –For easy identification, even from 100 feet away, drums of Chlorothene NU are distinctively color-coded in green and white. For more information about Chlorothene NU, call your distributor of Dow solvents. He knows all about its use, recovery and comparative cost. Or contact your nearest Dow sales office.

THE RIGHT SOLVENT FOR THOUSANDS OF INDUSTRIAL USES. Not only is Chlorothene NU recommended for cold-cleaning dip operations on the production line—it also cleans by spray, bucket or wipe methods. It's an all-purpose solvent for many applications, both on the production line and for maintenance use.

SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

The widest line of industrial solvents: Trichloroethylene, Perchloroethylene, Methylene Chloride, Chlorothene NU.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN DOW

See "The Dow Hour of Great Mysteries" on TV.

Squeezed for Storage Space?

UNIT MOBILE CRANES

make acres of low-cost outdoor storage space available

You can save valuable *indoor* space for production by utilizing low cost *outdoor* space for storage, as thousands of modern plants are now doing. Outside storage areas cost far, far less to construct and maintain than even the lowest cost new buildings.

Today, most anything can be stored safely outdoors, even in adverse climates, making use of modern protective wrappings, coatings, sprays and techniques, which open up acres of outdoor warehouse space.

Modern UNIT Mobile Cranes, too, make outdoor storage feasible and practical. They travel anywhere, quickly and safely; they give you long reach with big capacity for storing to greater heights; and operate in all weather with dependability, precision, safety and comfort for the operator. And the low maintenance cost of a UNIT makes it an outstanding materials handling machine.

Check your plant today and see if "roofless warehousing" isn't the answer to some of your production bottle-necks. And check UNIT also to see why it offers the most machine for your investment — then call your nearby UNIT Dealer. He'll be happy to survey your operations and suggest the UNIT that's engineered to your needs.

UNIT

CRANE & HOIST CORP.

6517 W. Burnham St.
Milwaukee 19, Wisconsin

Why **UNIT** is best for "roofless warehousing"

- **TIMESAVING MOBILITY** with self-propelled UNIT Mobile Cranes that travel fast — lift high — reach far — extending your "warehouse" limits . . . horizontally and vertically.
- **MORE MANEUVERABILITY** with a short turning radius, full revolving, compact machinery arrangement. Assures low overhead clearance and minimum width.
- **SAFETY CAB**—Full Vision cab provides safe, wide-angle visibility for operator in every direction, brings your "stock-picker" the comfort and efficiency of working indoors.
- **DISC TYPE CLUTCHES** and ventilated, oversize brakes insure smooth, safe, accurate handling of loads without "grabbing".
- **WIDE CHOICE OF MODELS** — 11 machines from which to choose . . . including truck and crawler cranes . . . from 10 to 40 ton capacities. Most models are convertible to various front end attachments for greater versatility.

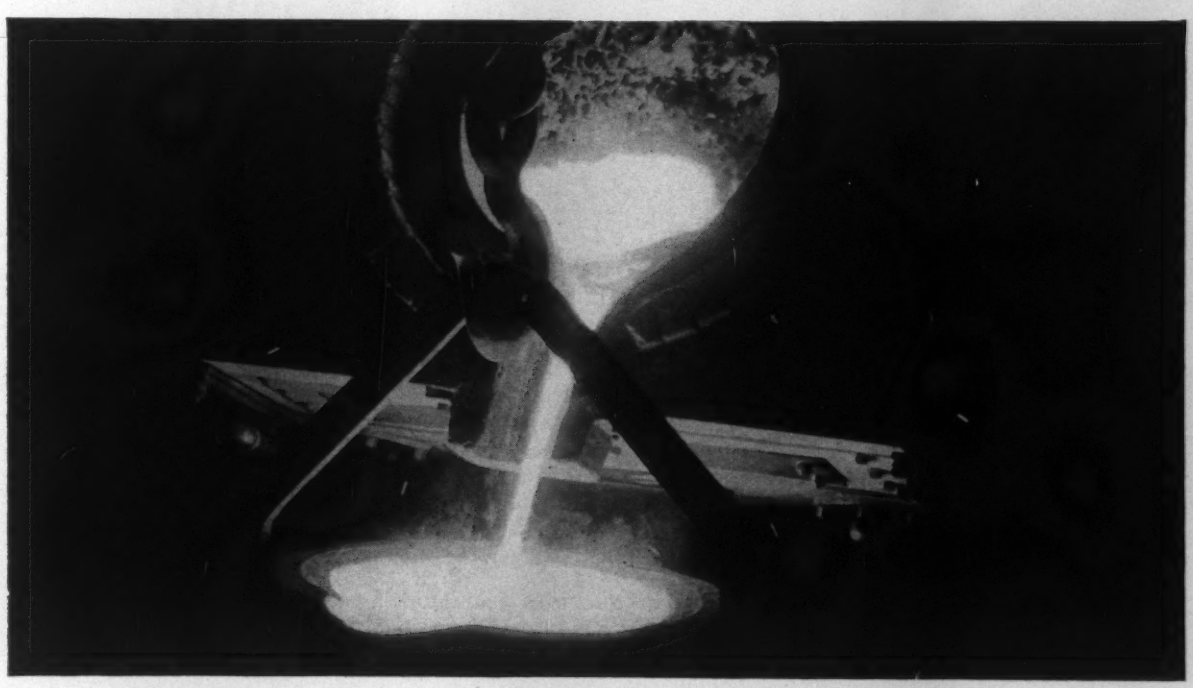
Add life to linings...

Norton MAGNORITE* fused magnesium oxide ramming mix rams easily to high uniform densities that provide extra long service life. Careful grain sizing minimizes segregation. Use wherever high refractoriness, inclusion-free melts, and low outgassing are "musts". Ideal for high frequency melting of alloy steels and high temperature alloys containing nickel/cobalt base; vacuum melting, etc. Proved performance record, in furnaces of all sizes.

Rammed Weight	172 lbs./cu. ft.
Grain Sizing	6F and finer
MgO	91.3%
Al_2O_3	5.2%
CaO	1.7%
SiO_2	1.5%
Fe_2O_3	.2%

For full information on ramming, sintering, etc., write NORTON COMPANY, Refractories Division, 209 New Bond Street, Worcester 6, Massachusetts.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



NORTON
REFRACTORIES
Engineered... Rx ...Prescribed

75 years of... Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

SHEFFIELD Aluminized Wire

Steps up Mileage Between Engine Overhauls

SHEFFIELD
ARMCO
Aluminized Wire

- AISI specifications 1006 to 1050
- 16-gauge through 6-gauge
- Packed in coils or on Sheffield Kone-Paks that give you on one continuous spool the equivalent of several ordinary coils of wire

WRITE FOR FREE SAMPLE

Longer piston wear at lower cost is a sure thing with Gillett and Eaton Insert Pistons. Why? For one reason, because they have a pre-shaped steel wire cast right in the piston wall where the top ring is located.

That wire insert is made of Sheffield Aluminized Wire. It's the only wire of its kind that stands up against excessive work hardening in this application. This is because of the extremely tight bond of aluminum coating on steel wire, made possible by Sheffield's patented method of making the wire. When cast in the piston wall, the aluminized wire forms a tight bond with the aluminum in which it is inserted. The exclusive Gillett & Eaton steel wire insert cuts top ring groove wear and greatly increases mileage between overhauls.

Whatever your use of aluminized wire, Sheffield metallurgical skill, engineering excellence and strict quality control assure you the wire that will do the best job. For further information, get in touch with your nearest Sheffield office.

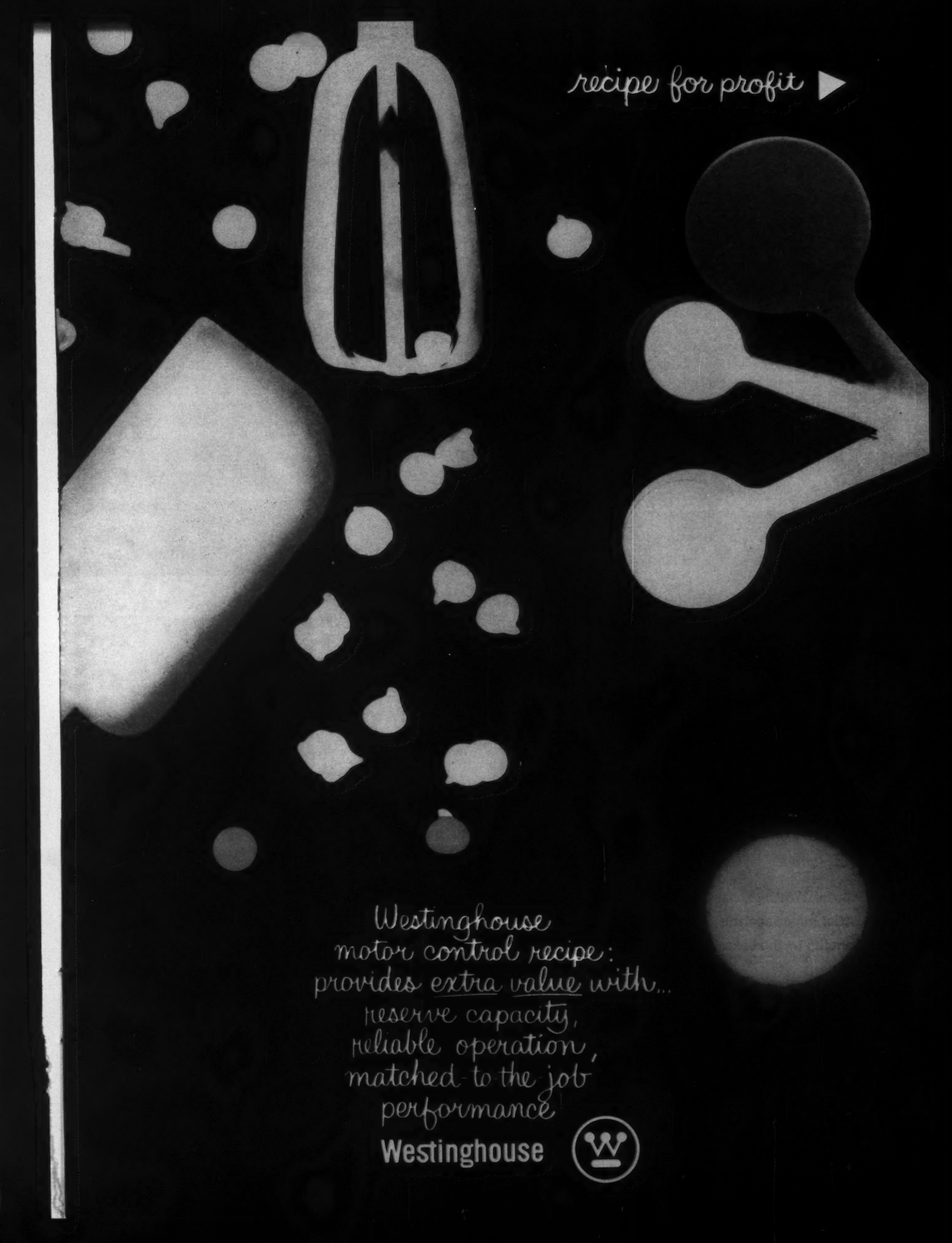
SHEFFIELD DIVISION

Sheffield Plants in Kansas City, Tulsa and Houston

ARMCO

ARMCO STEEL CORPORATION

OTHER DIVISIONS AND SUBSIDIARIES: Armco Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products


recipe for profit
Westinghouse
motor control recipe:
provides extra value with...
reserve capacity,
reliable operation,
matched to the job
performance
Westinghouse

TESTED RECIPES FOR PROFIT . . .

Westinghouse blends "hidden" ingredients in extra value controls for profitable plant operations

- Quality control
- Design ability
- Quality components
- Application experience
- Manufacturing know-how
- Maintenance facilities
- Extensive research

How does Westinghouse handle this basic control recipe to make the result superior to any other? The best chef knows that the quality of the ingredients used and the mixing knack account for the blue-ribbon winners.

At Westinghouse, highest quality control components plus a large portion of expert manufacturing skill, craftsmanship and experienced know-how are carefully blended. Such "hidden" ingredients mean industrial motor controls with reserve capacity to handle overloads . . . long, trouble-free service . . . and performance custom-matched to your needs. Qualities that give **more control value for your money.** Qualities more than sufficient to meet today's demands for extraordinary reliability. That's why it pays to look beneath the surface of any control to be sure you are getting Westinghouse quality.

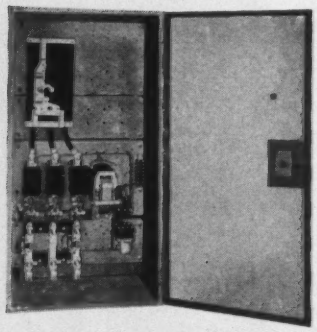
Your local Westinghouse representative is ready with a wide selection of industrial motor controls. Ask him to tell you more about their **hidden values** . . . benefits by the baker's dozen . . . for more profitable plant operations.

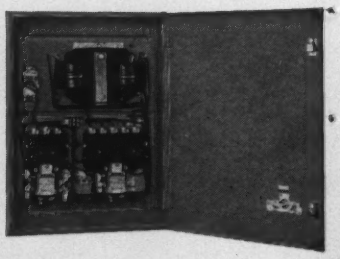
The proof of Westinghouse controls is in their using!

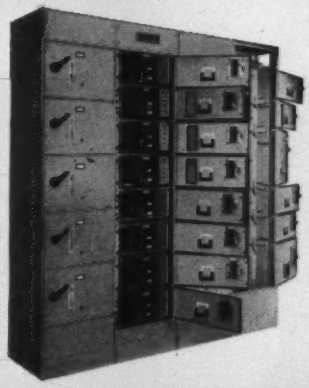
Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Westinghouse

Check your favorite chef's best dish. The recipe calls for the finest ingredients. However, real success comes from devoted attention to details. Superior product quality, likewise, requires premium components and craftsmanship.







Control Centers

Compact grouping of all motor controls
cuts installation time;
frees production areas;
permits easy one-man
control supervision;
speeds maintenance and service.

Interchangeable modular construction.

DESIGN TESTED AND PROVED in the Westinghouse HIGH POWER LABORATORY

Life-Line® Starters

Full-voltage, a-c magnetic starters in all NEMA enclosures.

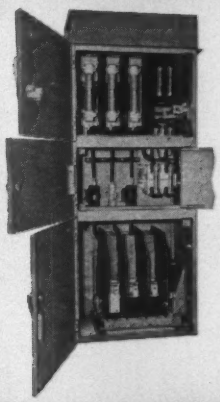
Time-tested components . . . straight-through wiring, front-accessible parts combine to slash installation and maintenance costs.

proved De-ion® arc quencher increases contact life . . .

silver plated interchangeable contacts . . . clapper-type operating mechanism . . . smaller compact designs.

Single phase or polyphase; up to 600 volts — reversing or non-reversing;

Non-combination or combination with disconnects or circuit breakers.



Ampgard* High-Voltage Starters

Maximum protection for motors, systems and personnel.

Faults interrupted in less than ½ cycle . . . isolates fault to prevent shutdown of other equipment.

Completely front accessible.

Externally operated line isolating switch.

Exclusive mechanical and electrical interlock . . . prevents switch operation under load; automatically stops motor when cabinet is open.

Full line available . . .
for squirrel-cage, wound-rotor and synchronous motors up to 3000 hp — up to 5000 volts.

* Trade-Mark

Reduced Voltage Starters

Widest possible selection of primary resistor, auto-transformer, part-winding and star-delta types for squirrel-cage, wound-rotor and synchronous motors in all hp ratings — up to 600 volts.

Manual and magnetic starters to provide the proper starting characteristics for any application.

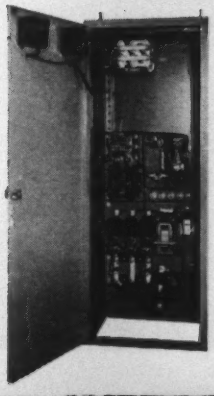
Available with integral circuit breaker or disconnect switch — fused or non-fused.

Enclosures available for every need . . .

general purpose . . . dust-tight industrial . . .

watertight . . . explosive atmospheres.

Available for immediate delivery.



Static Slipsyn® Synchronous Motor Control

Static transistor circuit guarantees . . . maximum reliability and accuracy; no moving parts to wear, corrode or fail; unaffected by contaminated atmosphere.

Motor field excitation applied at precise speed and pole position.

Adjustable pull-out protection, permits immediate detection or delays action to eliminate false tripping caused by transients.

Available as complete starter or field conversion unit for **any make** control!

J 28004-3

Reynolds Aluminum

saves 2 to 10 minutes machining time

Reynolds Holobar machines quickly to close tolerances. Hydromatics, Inc., saves two to ten minutes machining time per part.

HOLOBAR™

per part in ball valve production

Hydromatics, Inc. in Livingston, New Jersey, uses Reynolds Aluminum Holobar for two important reasons.

1. Holobar is aluminum bar stock—minus the core! Seamless mechanical tubing that saves reaming and boring time—a two to ten minute saving per part, depending on the part, for Hydromatics—and scrap is reduced, tool life is increased.

2. Holobar is all aluminum and strong, with increased strength at low temperatures—perfect for use in valves handling liquid oxygen at 3,000 psi at −297°F.

Hydromatics makes ball valves for both military and industrial use. Reynolds Aluminum Holobar is used for seat rings, spacer sleeves, seat retainers, and cups in these valves. Withstanding the chemical action of fuels and other fluids, Holobar retains its mechanical properties despite pressures and temperature extremes. And, as aluminum actually gains strength as temperature decreases, Holobar is perfect for use in cryogenic applications.

Since much machining is eliminated, tool wear is reduced and closer tolerances can be held, as heat and pressure generated in machining solid bar stock are reduced. Holobar also features uniform physical properties and wall-to-wall mechanical soundness. It has no core-to-surface variation often common in solid stock after machining.

Lower in cost than bar stock, Reynolds Aluminum Holobar, can save in many other ways: Holobar stock weighs less—is easier to handle and move. Scrap problems are reduced, and initial drilling costs are eliminated; boring costs are reduced. Available in alloys 2024, 6061 and 7075, sizes range from one inch to eight inches O.D. All alloys are not available in all sizes.

Reynolds Holobar is one of many ways in which Reynolds Aluminum serves industry with metal—and know-how. For full details on Holobar, or on any aluminum product, contact your Reynolds Distributor or write direct to *Reynolds Metals Company, P.O. Box 2346-DH, Richmond 18, Virginia.*

Hydromatics, Inc., makes valve seat rings, spacer sleeves, seat retainers, and cups from Reynolds Aluminum Holobar.

Watch Reynolds new TV show "Harrigan & Son", Fridays; also "All Star Golf", Saturdays—ABC-TV.

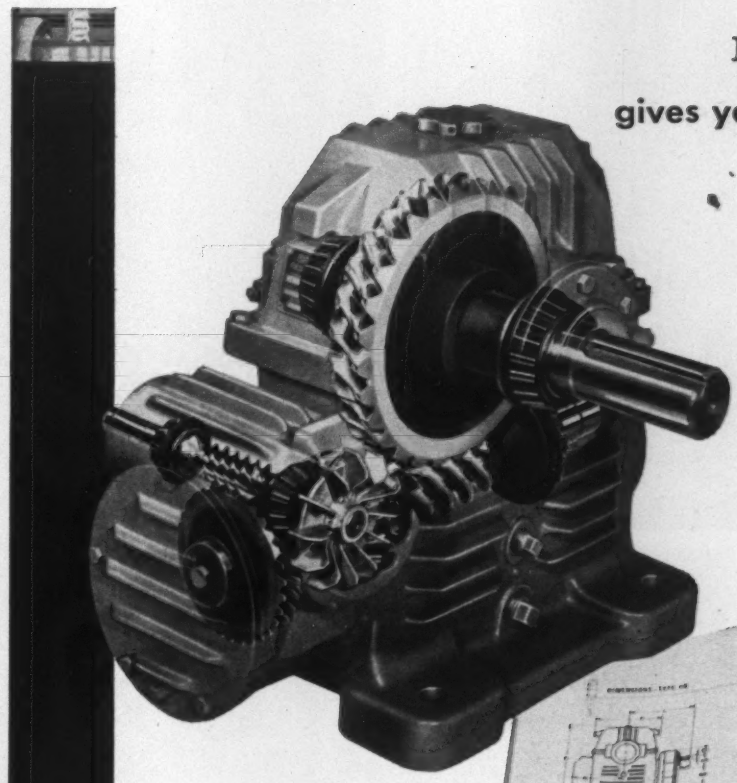
"Now get immediate of complete line of

A. T. Gallagher, Manufacturing Superintendent, Delroyd Worm Gearing.

"Here's a shot of our Delroyd Verso worm gear — one of hundreds being boxed and made ready for shipment. Unlike most speed reducers, this Verso unit can be mounted in any position — horizontal, vertical, upside down. • "This is but one model in a complete line of Delroyd worm gear reducers — with the widest range of horsepowers and sizes in the industry."*

*1⅛" center distance, fractional horsepowers — to 12" center distance, 152 horsepower. Reducers to 36" center distance with horsepower capacities to 700 are supplied as standard. Larger units to meet any requirement can be supplied on special orders.

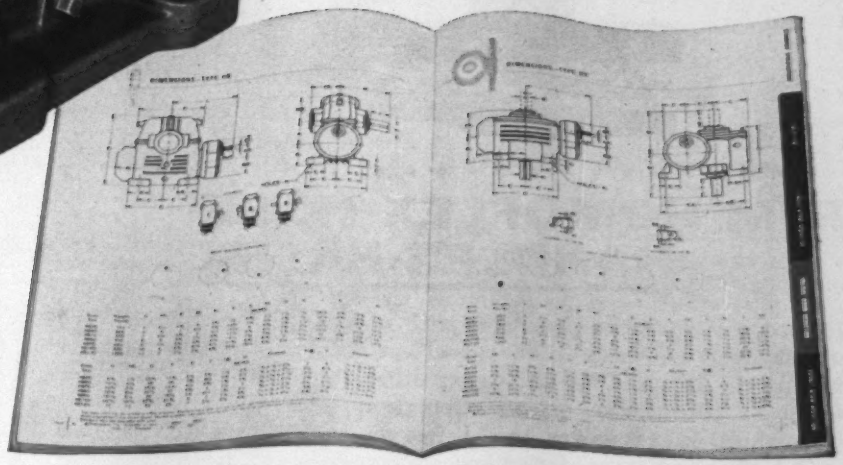
delivery
DELROYD worm gearing..."



DELROYD worm gearing gives you these superior design features:

- Exclusive involute helicoid thread form for highest load capacities
- Centrifugally cast bronze gear for increased mechanical ratings
- Fan cooled finned housings for higher thermal ratings
- Lower weight per horsepower
- More horsepower per dollar

NEW full color 84-page Delroyd Catalog:

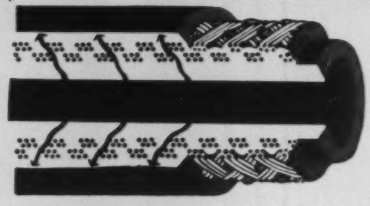


Now available — the worm gear industry's newest, most complete catalog. Contains all basic design and application data, selection charts, ratings and service factors — plus illustrations in full color. For your free copy, write on your company letterhead to: Delroyd Worm Gearing, De Laval Steam Turbine Company, Trenton, New Jersey.

DE LAVAL STEAM TURBINE COMPANY

899 NOTTINGHAM WAY, TRENTON 2, N. J.

DA-310



"MORE USE PER DOLLAR"

Rubber tie-gum penetrates Homoflex braided plies to provide an inseparable tube-to-cover bond . . . greater flexibility and lighter weight than any hose for equal pressure.

R/M HOMOFLEX HOSE HANDLES EASIER . . . LASTS LONGER

Homoflex Hose is mandrel-made with *no* pre-set twist—it coils and uncoils freely in *any* direction *without* kinking! It's the easiest handling hose made, in types for air, water, other fluids and gases. Exclusive Homoflex construction makes strength member and tube virtually inseparable, assures longer, trouble-free service life. Uniform inside and outside diameters permit faster, easier, *safer* coupling . . . faster, fuller flow.

Strong, light weight, and "flexible as a rope", Homoflex Hose adds up to real labor and cost savings wherever you use it around the plant. Let your R/M Distributor show you the many advantages of Homoflex and other types of R/M rubber hose for factory use.

- **SUPER-STRONG**
- **PRECISION BUILT**
- **LIGHT WEIGHT**
- **FLEXIBLE AS A ROPE**

Write for Bulletins M694 and M610

RM-1049

RAYBESTOS-MANHATTAN, INC.

MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

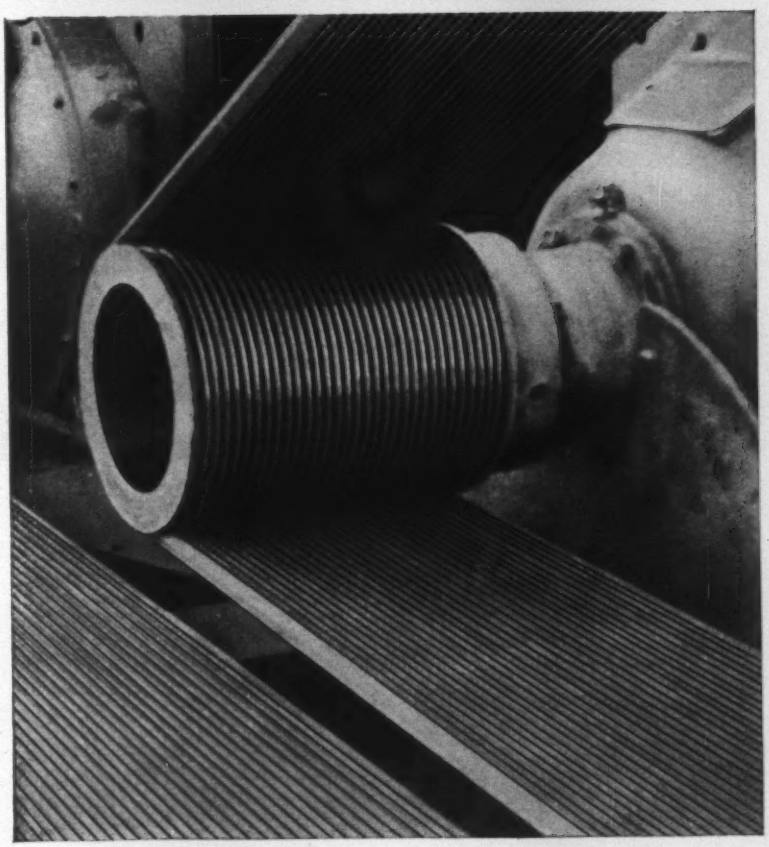
RM

ENGINEERED RUBBER PRODUCTS ..."MORE USE PER DOLLAR"

RAY-MAN CONVEYOR BELT

Engineered for 45° Idlers

You can now get up to 60% greater hauling capacity—save up to 20% on conveyor costs—as compared to using regular 20° idlers. Ordinary ply belts are too stiff and boardy to do the job—Ray-Man's exclusive flexible construction and built-in stress compensation is *guaranteed* to take the sharp angle of 45° idlers *without* ply or cover separation at the hinge line. Learn how Ray-Man Conveyor Belt opens up a whole new era of conveyor design . . . permitting larger loads . . . narrower conveyors —assuring longer cover wear, lower handling costs! Write for Bulletin M303.



R/M POLY-V® DRIVE

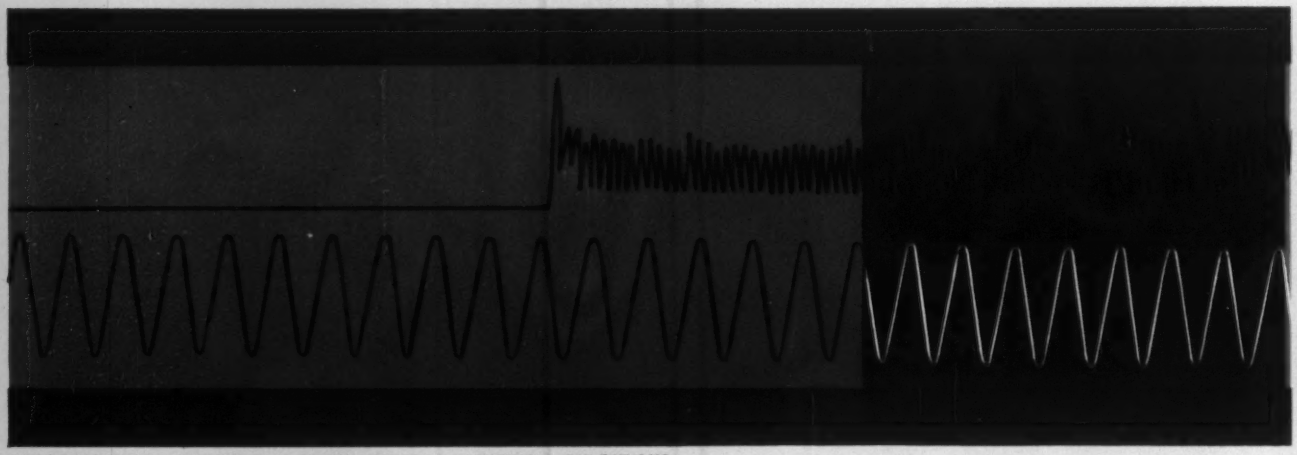
More Power— in *Less* Space *. . . with Reliability*

A *single unit* V-ribbed belt across full width of the drive-sheave—*not* an assembly of V-belts—enables patented Poly-V to deliver much *more* power in the same space as a V-drive . . . or *equal* power in much *less* space! Single unit belt design also eliminates belt "length matching" problems . . . minimizes equipment down-time and belt replacement costs. Belt speed ratios remain constant from *no* load to *full* load to provide the smoothest running, coolest running—*longest wearing* drive you can install. Maintain groove shape. Just two sections of Poly-V Belt meet every heavy duty power transmission requirement. Write for Bulletin M141, or call your R/M Distributor.

CONVERT TO RM POLY-V and BE SURE!

IT HAPPENS IN $\frac{25}{60}$ OF A SECOND / A COMPLETE WELDING CYCLE

LET OLIN ALUMINUM INTRODUCE YOU TO FAST, LABOR-SAVING MIG SPOT WELDING FOR ALUMINUM



WELDS HAVE BRAINWAVES, TOO. GRAPH RECORDS ELECTRICAL PULSATIONS DURING WHOLE WELDING CYCLE—COMPLETED IN 25/60 OF A SECOND.

OLIN MATHIESON • METALS DIVISION • 400 PARK AVENUE • NEW YORK 22, N. Y.

We'd like to show you a joining process that not only cuts your joining costs *substantially,* but also gives you a more salable product.

You might describe this process as riveting without rivets. For two years our Metallurgical Research Laboratories have been studying and refining the MIG spot welding process so that it can be profitably used on aluminum.

Now, we have tests to prove its reproducibility. We can demonstrate that weldments made by this simple, speedy method are as good or better than rivets or resistance spot welds for most applications. In fact, technicians and metallurgists have referred to this process as "metallurgical riveting."

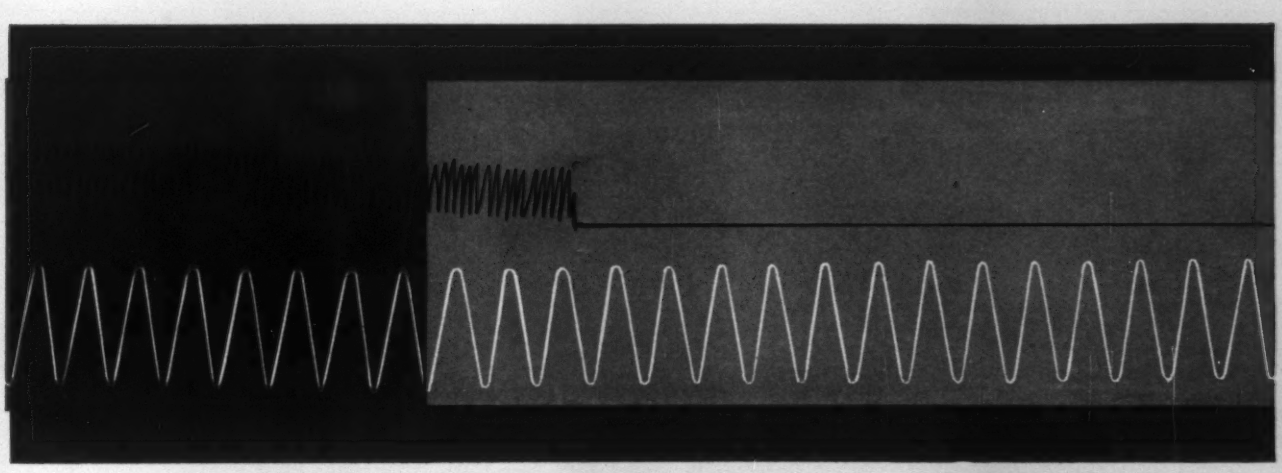
The MIG SPOT WELDING PROCESS overcomes previous difficulties associated with resistance spot welding such as the need for extreme cleanliness and very high capital equipment cost.

Consider the advantages of the MIG SPOT WELDING PROCESS for your particular operations.

FAST—12 spot welds a minute by one operator. Requires only one operator. **LABOR SAVING**—Eliminates hole punching. **SMALL INVESTMENT**—Inexpensive equipment. **EASY TO DO**—Simplicity of the process makes highly skilled operators unnecessary. **PORTABLE, COMPACT EQUIPMENT**—Easily moved to allow spot welding anywhere in the shop. **IMPROVES APPEARANCE**—No unsightly rivet heads. Where appearance is a prime factor, only one side of the weld joint is visible. **EXCELLENT PHYSICAL PROPERTIES**—Tensile, shear and fatigue strength of MIG Spot will equal or better those of rivets or ordinary spot welds. Corrosion resistance is equal to the aluminum alloy which it joins.

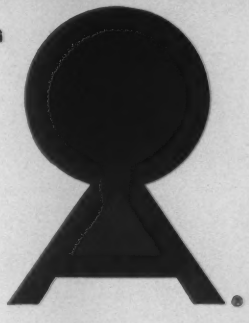
The testing, proving and refining of the MIG Spot Welding Process typifies the kind of progressive thinking at Olin Aluminum. Modesty aside, we're quite proud of the men in our Metallurgical Research Laboratories.

ELIMINATES HOLE PUNCHING, BUCKING RIVETS



LET US DEMONSTRATE THE ADVANTAGE OF MIG SPOT WELDING FOR ALUMINUM

BOATS
HOUSEBOATS
TRUCK TRAILERS
TRUCK BODIES AND TRUCK CABS
SHIPPING CONTAINERS
GRATING, CATWALKS AND TREADS
RADAR AND ELECTRONIC COMPONENTS
CONSUMER DURABLE PRODUCTS
ARCHITECTURAL APPLICATIONS



—angles

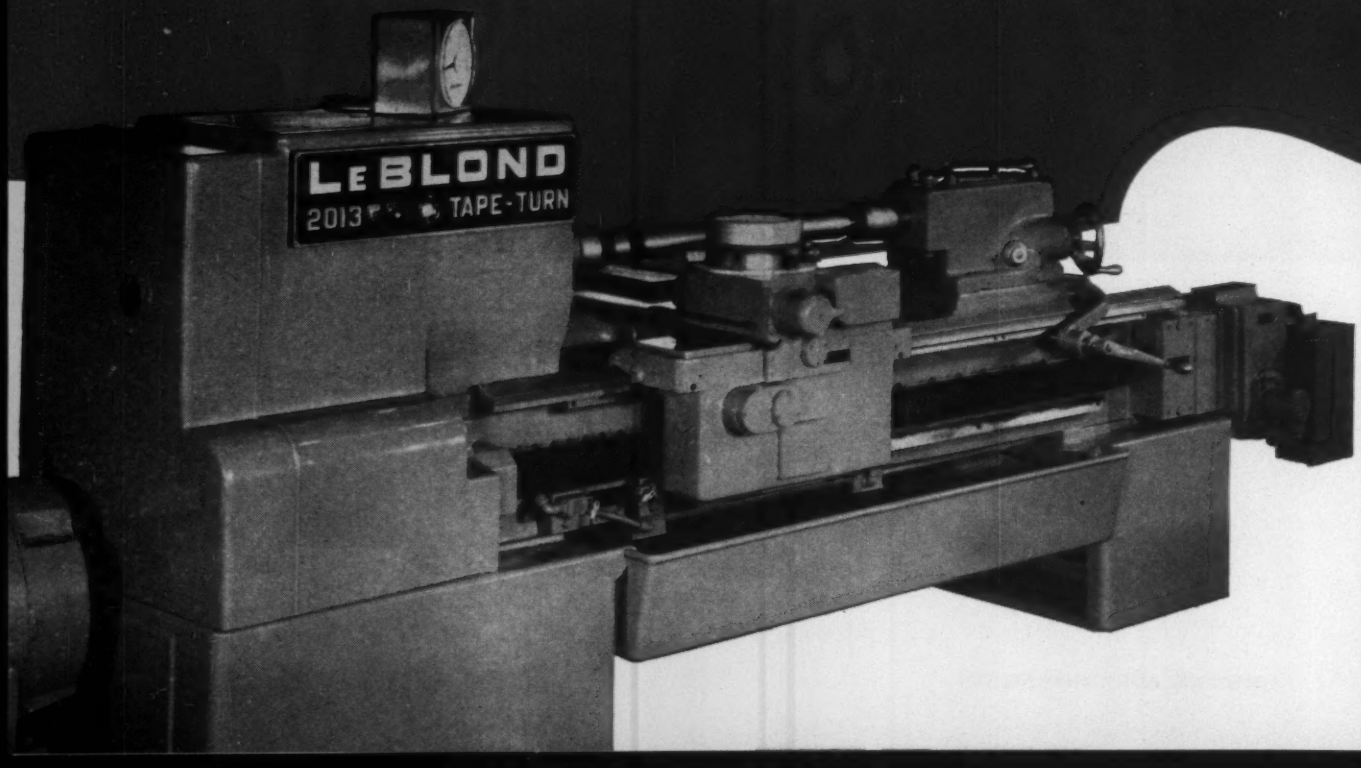
—tapers

—contours

LeBlond Tape-Turn

FULL NUMERICAL CONTOUR

• solid state circuitry • no computer needed
• no hydraulics and heat exchangers
• no vacuum tubes • no templates



—plunge cuts

—facing cuts

—straight cuts

—radii

TURNING

Slopes, curves, straight cuts, angles, radii, tapers, facing cuts, boring cuts — you name it, this new LeBlond Tape-Turn Lathe can do it. And without steps, apologies, or a computer.

LeBlond Tape-Turn Lathes are all heavy-duty models with a special headstock and carriage engineered for Generál Electric's new Mark Century tape control. This potent combination can easily cut tracer turning time by half.

Here's all the stamina, power, and versatility you need for production work, coupled with the simplest contouring control yet developed. Uses 8-channel paper tape just like common positioning controls.

Requires only a sine-cosine table for programming slopes, and no special aids for straight cuts or curves. The console is equipped with a pushbutton keyboard for overriding the taped program.

Continuous path control — no steps. Screw cutting mechanism and control provision for curves with radii greater than 10" available on special order.

Ask a LeBlond representative today for a demonstration on one of your turning jobs. With LeBlond you cut with confidence.

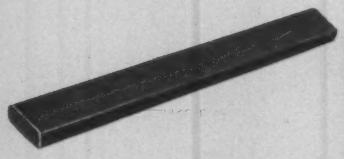
The R. K. LeBlond Machine Tool Co.

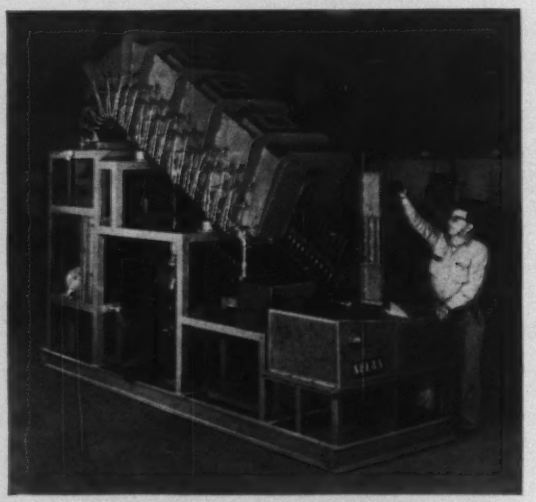
Madison at Edwards Roads, Cincinnati 8, Ohio

LeBLOND of Cincinnati

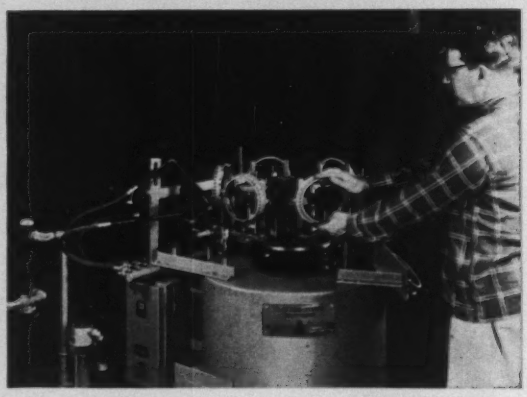
NEW SLANTS ON HEAT PROCESSING FROM SELAS

here's how industry cuts costs product quality with Selas

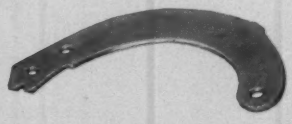


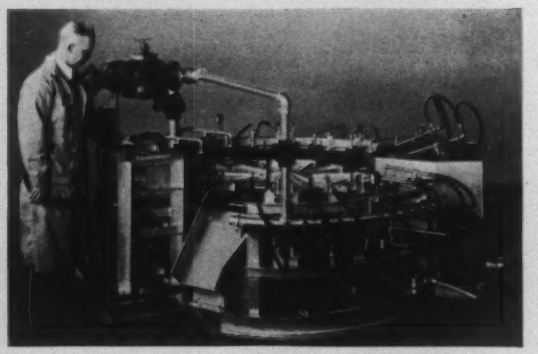


FORGING *Continuous unit fits compactly into production line to heat alloy steel bars for forging into C-shaped rail anchors. Production is synchronized with the forging bulldozer, up to 620 bars per hr. Inventory of work-in-process is ⅓ to ¼ of previous equipment . . occupies 20% less floor space . . reduces scale 95%. Precise heating assures consistently uniform grain structure and hardness.*



BRAZING *Compact machine automatically silver brazes Carboloy cutter to stainless steel shredder ring used in garbage disposal units. Precise fixturing, localized high-speed heating and automatic unloading permits one operator to produce up to 200 pieces per hr. . . Completely shop-assembled at Selas, unit was installed in customer's plant, ready for production operations, within hours.*





SELECTIVE HARDENING *End portions of brake shoe webs are hardened to create a more durable product. An indexing conveyor brings the two ends of webs under Duradiant burners. Designed for automatic loading, the machine heats, quenches, tempers and mechanically unloads the selectively-hardened work pieces. Service life of webs has been extended, costs have been reduced.*

. . . improves heat processing equipment

ANNEALING *Six-station dial conveyor automatic machine anneals a narrow band on stainless steel auto hub caps. Workpieces rotate above burners, bringing 2-in. wide band to 1800°F. in 30 sec. Production is 600/hr. Only 6 ft. 6 in. in diam., unit is located directly in the press shop production line.*

The installations on these pages demonstrate how Selas automatic heat processing equipment

- cuts operating costs
- increases production rates
- minimizes in-process inventory
- reduces labor requirements
- saves valuable floor space
- improves product quality

Specifically designed and custom-built to meet your individual production requirements and job specifications, Selas heat processing equipment employs time-proven standardized engineering features for longtime operating dependability and minimum initial investment. Problems usually associated with divided responsibility are avoided since Selas starts-up and services every machine it designs and builds.

Selas automatic or semi-automatic heat processing equipment can help you produce better products at lower costs. At your convenience—without obligation to you—a Selas field engineer would welcome the opportunity to survey your requirements.

For this free, personal service, or for literature on any of the heating operations shown here, write Mr. W. B. Troupe, General Industry Division.

SELAS CORPORATION OF AMERICA
110 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S. A., Pregny, Geneva, Switzerland. INTERNATIONAL REPRESENTATIVES AND LICENSEES: CAMBODIA, FORMOSA, KOREA, LAOS, VIETNAM—Cosa Export Co., Inc.; JAPAN—International Machine Co., Ltd., Tokyo; FRANCE—Societe Exploitation de Produits Industriels, Paris.

SELAS

HEAT AND FLUID PROCESSING ENGINEERS

DEVELOPMENT
•
DESIGN
•
CONSTRUCTION

FOR HIGH REACTIVE RESILIENCY...

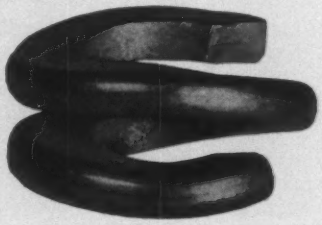
Eaton Manufacturing, Reliance Division, uses Republic A-9250 Alloy Steel

Lock washers for railroad joint applications must minimize track movement. At the same time, they must be resilient enough to eliminate the possibility of frozen joints.

Eaton Manufacturing Company, Reliance Division, is a major producer of these lock washers. They use Republic A-9250 Hot Rolled Alloy Steel. Bars are drawn into heavy gage wire, wound around a mandrel, cut off, and heat treated to exacting specifications.

High quality of alloy—according to Reliance—is essential in meeting requirements of the American Railroad Association. The same high quality, realized on a day-in, day-out basis, has minimized scrap loss.

Republic metallurgists will help you select and apply the alloy steel best suited to your needs. For information, contact your Republic representative or mail the coupon.



Track joint lock washers are produced by Eaton's Reliance Division, Massillon, Ohio, in 12 different diameters.

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World's Widest Range of Standard Steels and Steel Products

SEE OUR EXHIBIT

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1960 METAL SHOW
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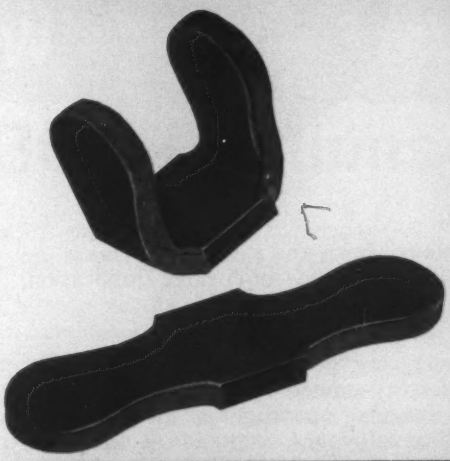
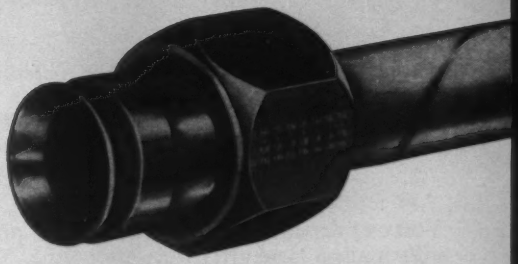
OCT. 17-21

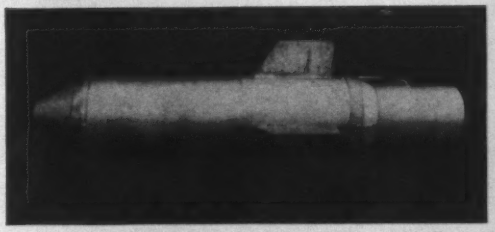
BUILD IT BETTER WITH AMERICA'S STEEL



ALOFS MANUFACTURING COMPANY, Grand Rapids, Michigan, uses Republic Type "M" High Strength Steel in the production of universal joint yokes for tractor power take offs. Subject to severe strain and impact, component parts are stamped into U or "slingshot" form from ⅜″ x 1½″ flats. Send for data on Republic High Strength Steels—"M," "50," "65," and "70." Minimum yield strengths from 50,000 to 70,000 psi . . . tensile strengths from 75,000 to 90,000 psi.



JOIN THE MANY EQUIPMENT BUILDERS switching to Republic ELECTRUNITE® Hydraulic Fluid Line Tubing. This *welded* tubing is easier to flare, bend, and machine . . . meets or exceeds the normal life of tubing produced by any other method. Available in all sizes shown in the JIC Standards Book, ELECTRUNITE offers appreciable savings in initial cost. Made from close-tolerance flat-rolled steel. Inner surfaces carefully checked before tube is formed. Send for copy of specifications.



UNUSUAL TITANIUM APPLICATION: High speed plankton samplers designed and built by the Fisheries Instrumentation Laboratory, Seattle, Washington, utilize Republic Titanium (RS-140) in the body, nose cone, and fins. In addition to corrosion-resistance, titanium has the strength and resilience required in rough seas at towing speeds of up to 15 knots. Light weight allows easy handling on small research boats.

REPUBLIC STEEL CORPORATION
DEPT. IA-9905
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:
☐ Hot Rolled Alloy Steel ☐ Titanium
☐ High Strength Steels—"M", "50," "65," and "70"
☐ ELECTRUNITE Hydraulic Fluid Line Tubing

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POSITIVE DUPLICATION – EVERY TIME!

You can depend on a rubber stamp to print identical information time after time after time. You can also depend on the Positive Duplication of these portable (PD)*Wheels . . . and *all* CINCINNATI (PD) GRINDING WHEELS.

HERE'S HOW (PD) IS ACHIEVED

To supply you with wheels of uniform excellence, Cincinnati's unique (PD) manufacturing process is unvaryingly regulated by 36 separate quality controls . . . For example humidity and temperature of the Wheel Mold Room are kept at the same levels every hour of every day throughout the year—an essential safeguard of (PD) uniformity.

RESULT: DEPENDABLE PERFORMANCE

Each (PD) reorder wheel gives you exactly the same good job as the original. Production goes up and stays up. Costs go down and stay down. This is the promise—and performance—of Positive Duplication.

CALL CINCINNATI TODAY

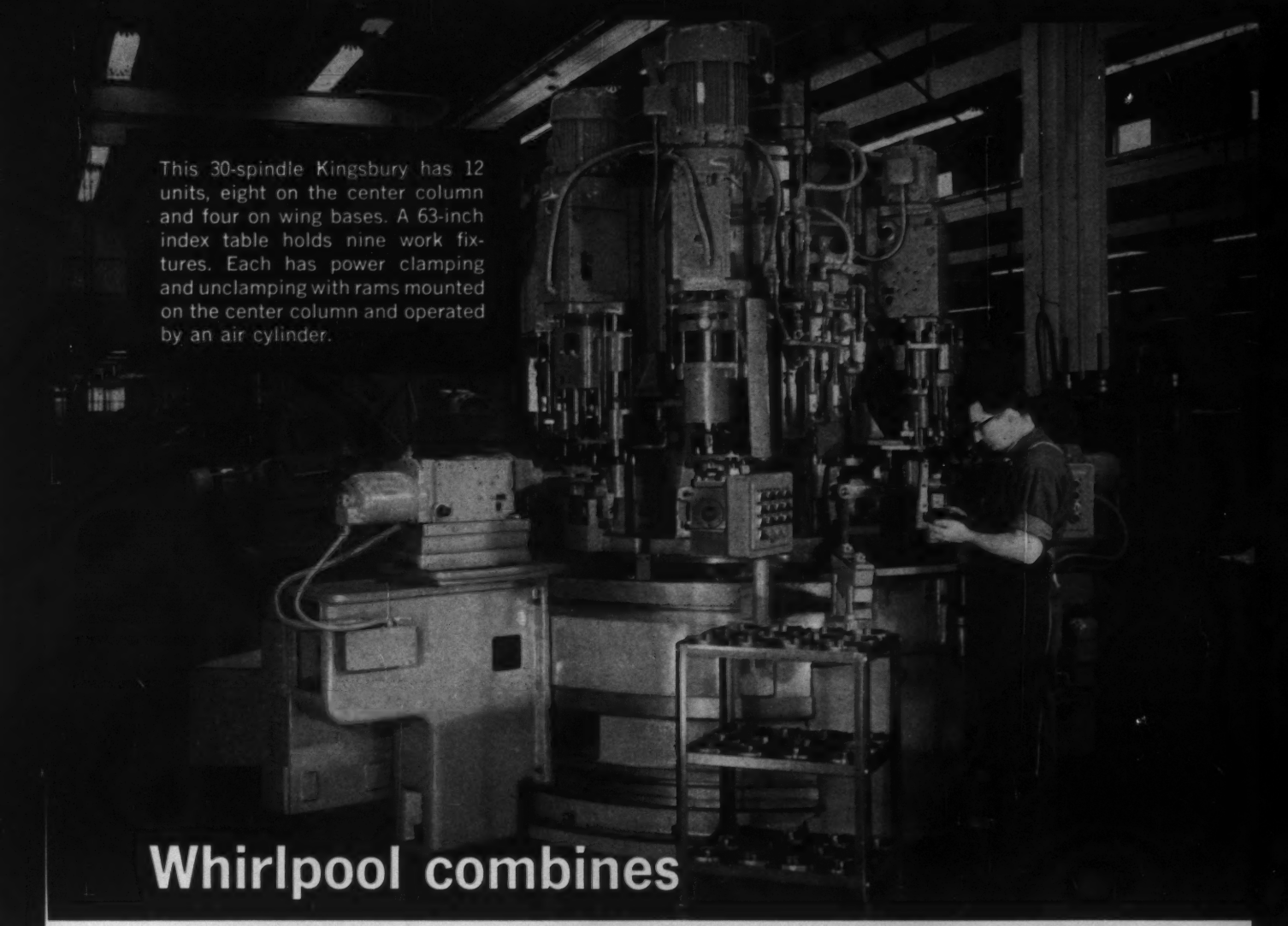
Solve your snagging problems with the help of Cincinnati's factory-trained specialists. Their wide experience in snagging operations of all kinds is at your service. Just call your CINCINNATI (PD) GRINDING WHEEL Distributor or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI® GRINDING WHEELS

*Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.



This 30-spindle Kingsbury has 12 units, eight on the center column and four on wing bases. A 63-inch index table holds nine work fixtures. Each has power clamping and unclamping with rams mounted on the center column and operated by an air cylinder.

Whirlpool combines

30 operations on one Kingsbury

420 parts per hour gross with 8.6 second time cycle

This machine for Whirlpool bores, counterbores, chamfers, drills and reams in one chucking of the work.

You can do this too and save money. A Kingsbury may not cost as much as you think, because it can replace several general-purpose machines. Just think of the saving in work-in-process inventory as you eliminate several banks of parts ahead of all those machines.

You get other savings with a Kingsbury. Important savings from low maintenance. Less downtime. Low scrap loss. Fewer repair parts. And, of course, lower labor costs. That's because of good basic design and rugged accurate construction. Kingsbury machines run year after year, through millions of cycles, without giving you trouble.

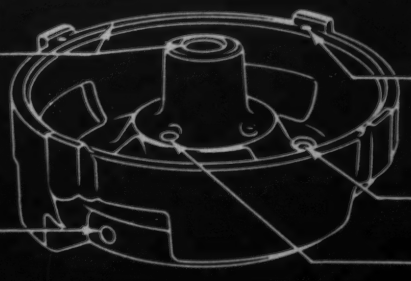
If you need high production at low cost, ask us to give you a specific proposal. Even if your operations are less complex than Whirlpool's, we may be able to help because we build simple machines, too. Kingsbury Machine Tool Corporation, Keene, New Hampshire.

KINGSBURY

CAST IRON FRONT HEAD FOR REFRIGERATION UNIT COMPRESSOR

Four Vertical Units
ROUGH BORE — TWO STEPS
COMB. SEMI-FINISH BORE
FORM 45° CHAMFERS
CHAMFER STEM & FACE
FINISH BORE

Four Horizontal Units
DRILL — 3 STEPS
REAM



Four Vertical Units with 22 Spindles
DRILL FOR C'BORE
TAP DRILL THRU
TAP THRU
C'BORE — 4 HOLES
DRILL
C'BORE — 2 STEPS
DRILL — 2 STEPS

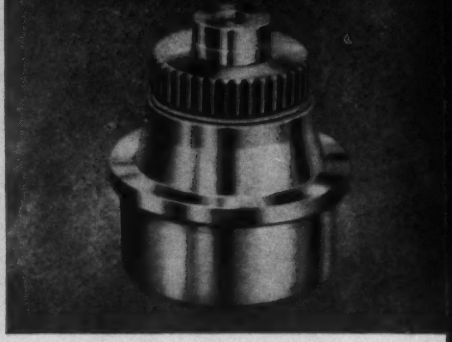
UNBRAKO

INDUSTRIAL FASTENERS like this Socket Head Cap Screw are produced to a dynamic reliability standard as a result of SPS research. The SPS line includes a limitless variety of self-locking screws, locknuts and precision fasteners for everything from massive machinery to the most minute products.

SPS AIRCRAFT

AIRCRAFT/MISSILE FASTENERS like this bolt are produced to ultra-high performance standards at SPS. Today's lightest, strongest fasteners in standard and special designs are products of SPS. Research and development work includes titanium, beryllium and other lightweight, high-strength exotic metals.

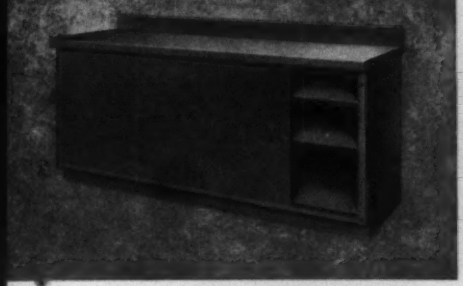
SPS NUCLEAR



NUCLEAR COMPONENTS like this cap for a core housing are held to almost unbelievable dimensional tolerances. The nuclear energy field depends on SPS for threaded fasteners, control rod drive mechanisms, motor tubes, core components, instrumentation housings and many other essential parts.

SPS human engineering

HALLOWELL



SHOP EQUIPMENT for industry and schools is made to the same superior quality standards as other SPS products. The Hallowell line offers broad coverage of standard and special needs in work benches, shelving, and similar equipment. Ruggedness and space efficiency are well identified with Hallowell.

COLUMBIA

OFFICE FURNITURE like this handsome Columbia Nine-to-Five unit sets an office apart with distinctive styling and color combinations. The complete line includes efficiently designed, durable steel office furniture, plus special units, a wide choice of smart chairs, filing cabinets and accessories.

I. E. I.

CAPACITORS FOR ELECTRONICS bearing the IEI trademark are widely used for subminiature circuitry and transistorized applications. This SPS company makes both aluminum and tantalum capacitors, including the lightest and smallest per given capacitance in the industry, to the highest quality standards.

improves the fit where you sit

Columbia office chairs are something special in comfort and efficiency. And little wonder.

An astonishing amount of new thinking, research, testing and just plain sitting went into their creation two years ago.

The assigned engineers had never before designed a chair! There were no "sacred cows".

A roomful of competitive chairs pointed up fault after fault. Too narrow. Too hard. Skinny arms. Teetery. Pushy. Hard to adjust.

Human engineering took over. Engineers, salesmen, executives, secretaries and even visitors were recruited. Fat one. Thin one. Tall. Short. Erect. Slouched. Some sat in warm modeling clay. Others sat in scientific contour measuring devices. Dozens just sat and sat . . . and filled out questionnaires.

Out of all this, and some solid technical research in the laboratory, came chairs with exciting styling and heavenly comfort. No pinch. No teeter. No aches. And when you lean back, you get what you leaned back for—blessed relaxation.

Today there are 27 styles in the skyrocketing Columbia Chair line—available in 98,000 combinations of color, fabric, style, size and type of seat—to complement any Columbia Office Furniture grouping.

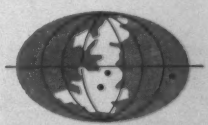
Unusual? Not at all. Chairs, filing cabinets, fasteners or nuclear components, SPS brings reliability and enthusiasm to bear on any problem. Can we handle one for you?

UNITED STATES

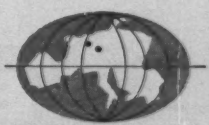
CANADA

SPS

where reliability replaces probability



GREAT BRITAIN



EUROPE

STANDARD PRESSED STEEL CO., Jenkintown, Pa., Santa Ana, Calif. • The Cleveland Cap Screw Company, Cleveland, O. • Columbia Steel Equipment Div., Fort Washington, Pa. • International Electronic Industries, Inc., Nashville, Tenn. • National Machine Products Div., Utica, Mich. • Standco Canada, Ltd., Toronto, Canada • Unbrako Socket Screw Co., Ltd., Coventry and Unbrako Steel Co., Limited, Sheffield, England • Unbrako Schrauben G.m.b.H., Dusseldorf and Koblenz, W. Germany.

New B&W REFRACTORIES FOR THE METALS INDUSTRY

B&W's line of refractories has been enlarged by the addition of new heavy duty firebrick and new ramming mixes. These new products, now offered after many years of developmental and field experience, are specifically designed for superior service in blast furnaces, electric furnace roofs, submarine ladles, metal mixers, soaking pits, billet and slab heating furnaces, salt bath furnaces, aluminum melting furnaces, lead melting furnaces, zinc recovery furnaces, nickel smelting and copper and brass furnaces.

FIREBRICK

★

KAO-HB

HIGH BURNED SUPER DUTY FIREBRICK

Fusion point 3220 F. This brick offers an excellent balance of properties to assure superior service. It provides approximately 5% more alumina content and lower total impurities than competitive brick. It has excellent spalling resistance.

KAO 60

60% ALUMINA FIREBRICK

Fusion point 3250 F. Provides higher hot load strength than any competitive brick. Spalling loss is only 1%.

KAO 70

70% ALUMINA FIREBRICK

Very low total impurities provide long life. Spall loss of only 2%.

RAMMING MIXES

★

MULRAM E

Use limit 3200 F. Alumina content—80%. This new ramming mix with extremely low permeability provides exceptional resistance to slag or molten metal penetration. High strength provides good erosion resistance.

MULRAM EF

Use limit 3100 F. Alumina content—80%. Similar to Mulram E but supplied in finer grain.

MULRAM CB

Use limit 3000 F. Alumina content —78%. A new chemically bonded dry ramming mix that provides greater strength at low temperatures, high modulus of rupture and excellent resistance to abrasion, slag and scale.

FOR COMPLETE PROPERTIES SHEETS and additional information on these new B&W Refractories products, write to The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, N. Y.

B&W

THE BABCOCK & WILCOX COMPANY

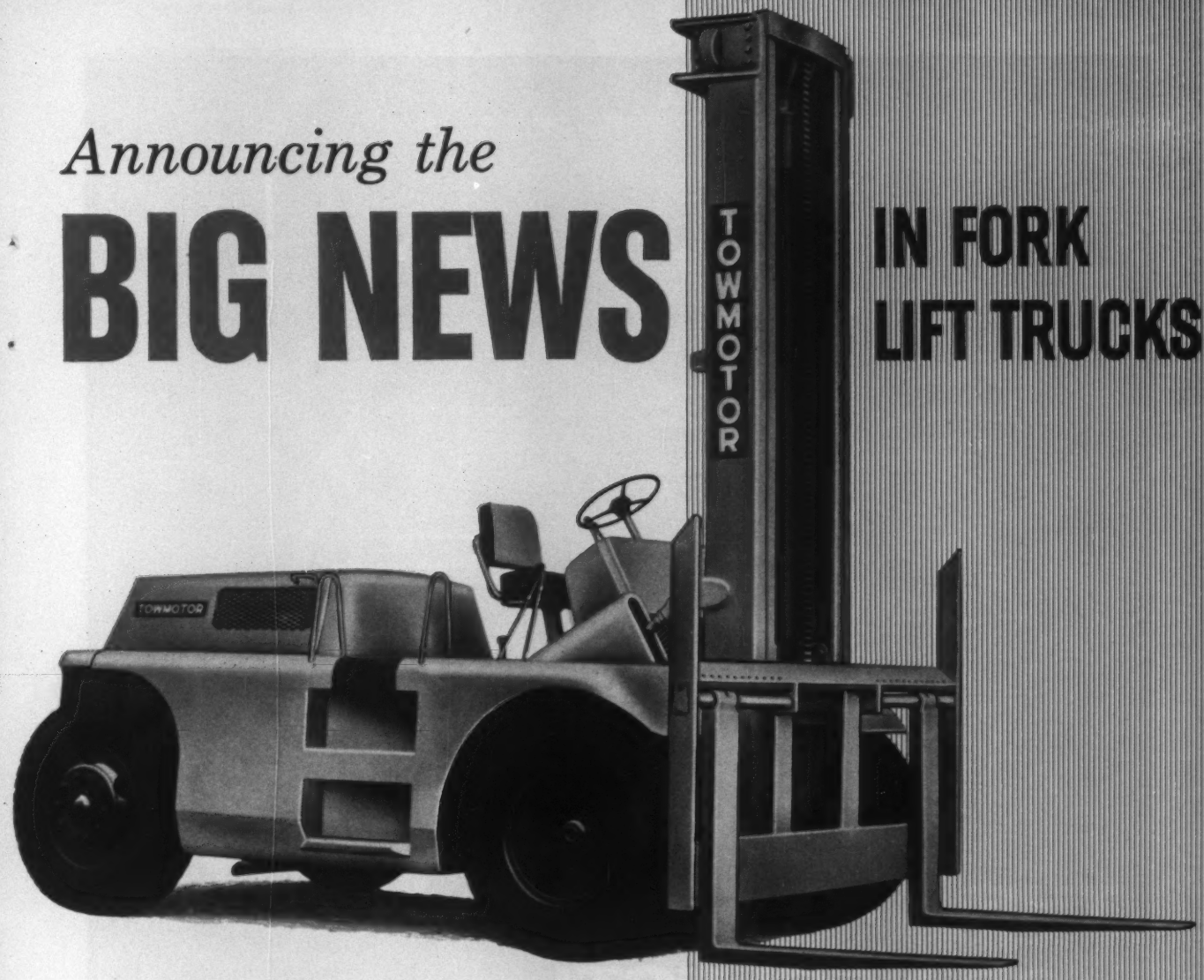
REFRACTORIES DIVISION

R-957

B&W Firebrick, Insulating Firebrick, and Refractory Castables, Plastics, Ramming Mixes, Mortars, and Ceramic Fiber.

Announcing the

BIG NEWS IN FORK LIFT TRUCKS



If you unload, move, stack and load heavy materials be sure to get information on the new big-capacity Towmotor "Monarch" Series Fork Lift Trucks. They're as new . . . all-new . . . as they look!

All eight of the new "Monarch" Series models are built to handle your roughest and toughest jobs . . . yet they are easy to handle . . . and feature—

- New High-Traction "Low Profile" Styling
- New Extra-Visibility Mast Design
- New Equalized Weight Distribution
- New "Unitized" Frame and Body Construction
- New Up-Dated Easy-Operation Features

They all include many more engineering "firsts" described in new Towmotor "Monarch" Series bulletins covering models with 5 to 12 ton load capacities. For specifications, write Gerlinger Carrier Co., Dallas, Oregon.

TOWMOTOR

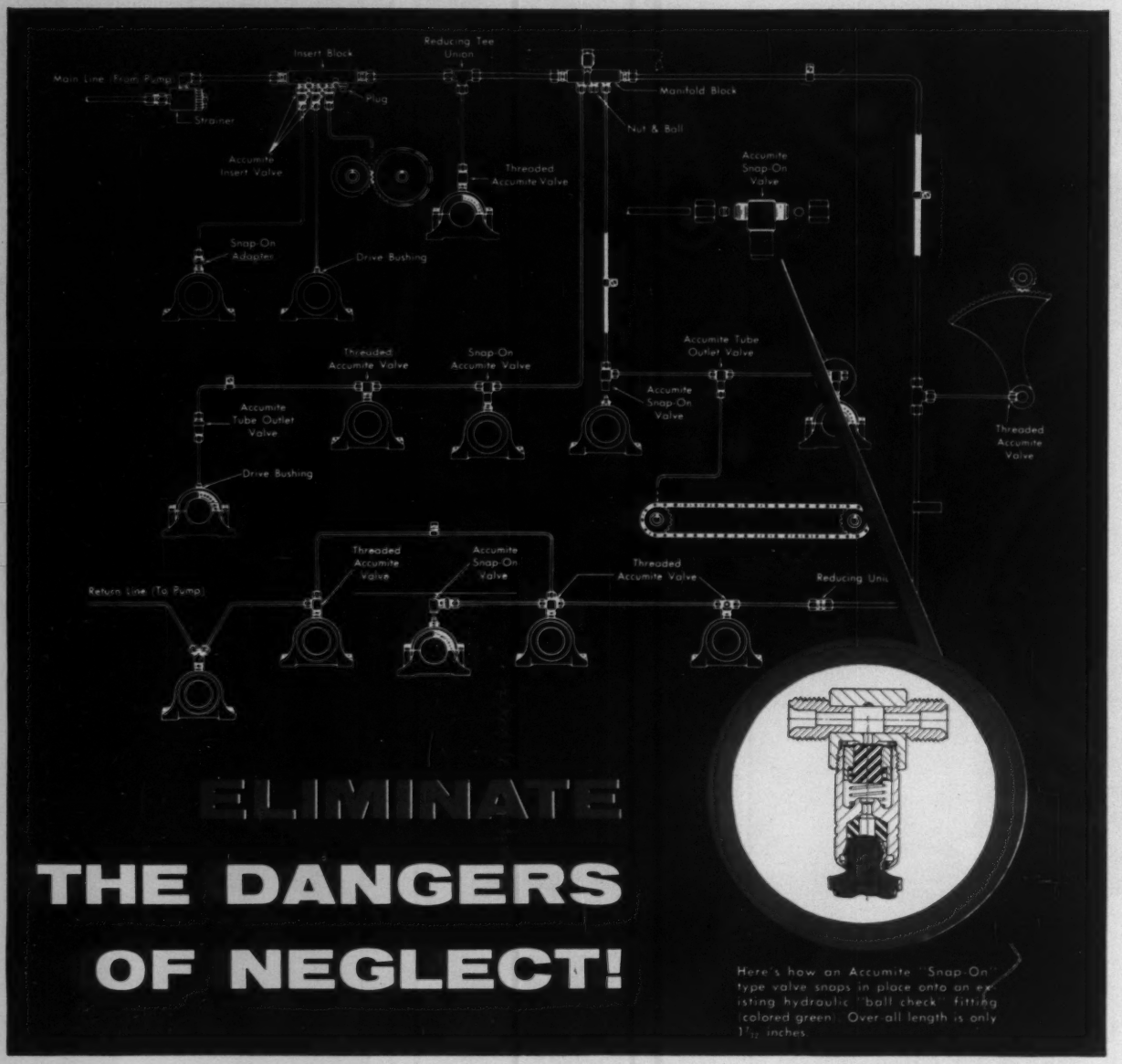
"MONARCH"

AN ALL-NEW SERIES OF HEAVY DUTY FORK LIFT TRUCKS BY

TOWMOTOR THE ONE MAN GANG ® -GERLINGER

Gerlinger Carrier Co., Dallas, Oregon, is a subsidiary of Towmotor Corporation

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919



Alemite Accumite® Centralized Lubrication System avoids costly breakdowns, work-stoppage. Automatic positive lubrication protects all machines!

The Alemite Accumite® Centralized Lubrication System comes complete with pump, metering valves and controls. Meters exact amount of lubricant to all bearings whenever system is operated by air, vacuum or manually at any predetermined frequency.

There's no need for a lubrication shutdown. No chance of work spoilage or bearing failure due to over lubrication. The Alemite Accumite System accurately meters .003, .006 or .009 cu. in. shots of oil or grease automatically. Is available with adjustable fittings for applications requiring measured metering from .003 cu. in. to zero. "Snap-On" and "Screw-In" type valves make for complete flexibility in converting existing systems to automatic operation.

You are assured economical, trouble-free operation of equipment. All bearings are sealed against dirt, grit and water. You are able to eliminate the dangers of neglect because all bearings receive proper lubricant in one, automatic, safe operation!

For complete details on Alemite Accumite® Centralized Lubrication Systems for large or small, stationary and mobile equipment (Canning and Labeling Machines • Tractor Trailers and Lift Trucks • Farm Implements • Machine Tools • Textile Machines • Any Machine or Vehicle with Moving Parts) write for your *FREE* Alemite Accumite Catalog . . . today!

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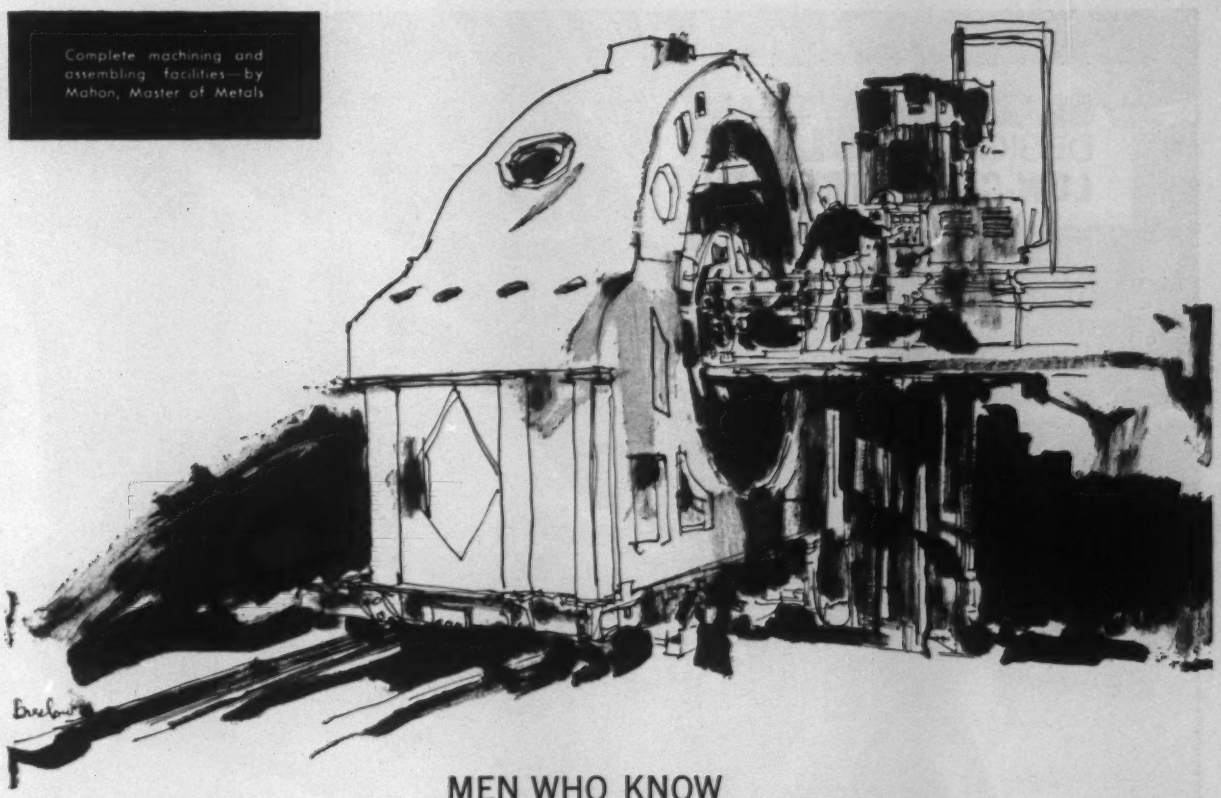
ALEMITE DIVISION
STEWART-WARNER CORPORATION

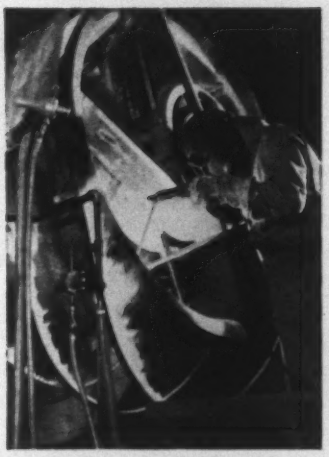
1850 Diversey Parkway, Chicago, Illinois

Complete machining and assembling facilities—by Mahon, Master of Metals



MEN WHO KNOW
FACILITIES, **CAPACITY** AND EXPERIENCE,
BUY...

"fabrication by Mahon"



The Mahon benchmark—*the touch of a torch*—by a skilled welder.

Capacity for engineering . . . capacity for production . . . capacity for your fabrication, that's the Mahon Steel-Weld Division. Whether your work is mechanical or structural, a one-time design or a production run, Mahon offers a ***single-source-service*** to do your job best. Mahon's extensive facilities, large capacity and long experience insure you of the highest quality product at lowest cost . . . delivered on schedule. For heavy parts in particular, Mahon's Steel-Weld Division should be your No. 1 supplier. We suggest that you investigate how Mahon capacity can be used profitably in the products you make or the equipment you use. Let us prove why, you too, should specify "fabrication by Mahon."

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OR FOR ON-THE-SPOT HELP DISCUSS YOUR PROBLEM
WITH A MAHON FABRICATION ENGINEER.

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Manufacturing Plants—Detroit, Michigan and Torrance, California

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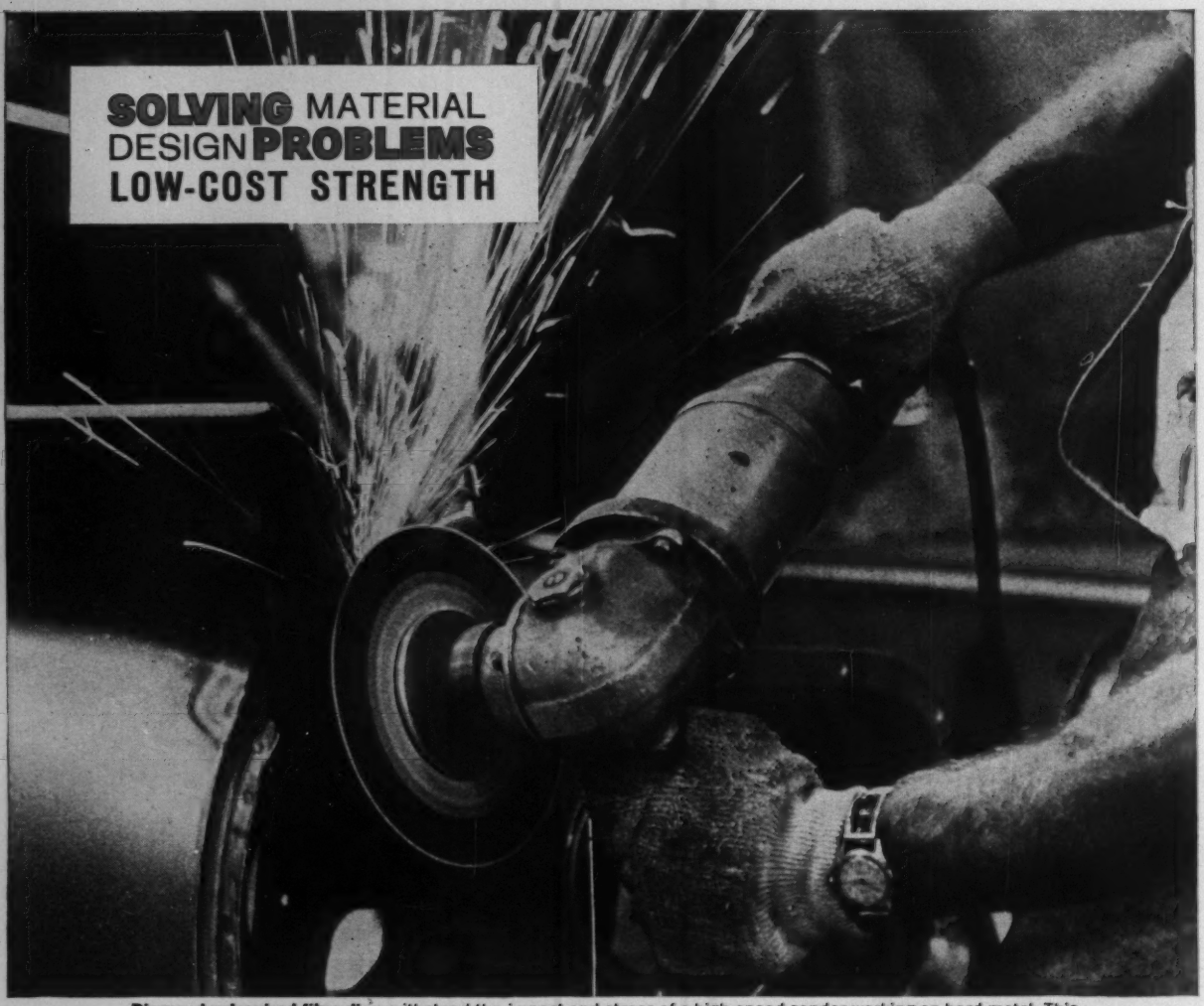
MAHON

SOLVING MATERIAL DESIGN PROBLEMS LOW-COST STRENGTH

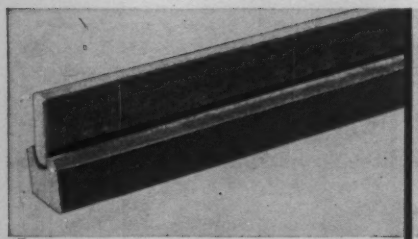


Diamond vulcanized fibre discs withstand the impact and stress of a high-speed sander working on hard metal. This tough and flexible material combines long life with very low cost in some of the most difficult jobs in industry.

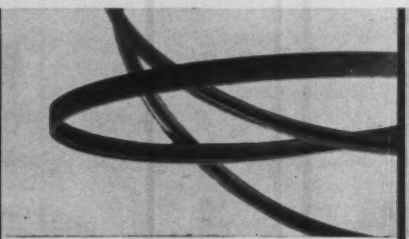
Tough, light-weight and low cost, Diamond® vulcanized fibre is an electrical insulator that combines excellent mechanical properties with easy fabrication in low cost tools. It is available in standing forms or in parts manufactured to your specifications. Whatever other properties you're looking for — heat resistance, long wear, machinability or compressive strength — you can easily find in the industry's most complete line — CDF laminated plastics, vulcanized fibre and flexible insulating materials. Check our specs in Sweet's PD file or write on your letterhead for General Folder 60.

CONTINENTAL-DIAMOND FIBRE

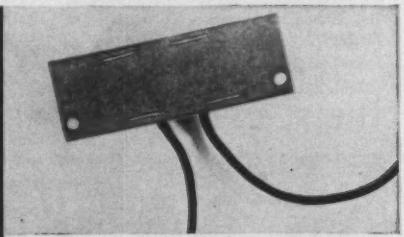
CDF® A SUBSIDIARY OF THE Budd COMPANY • NEWARK 85, DEL.
In Canada, 46 Hollinger Road, Toronto 16, Ont.



Low coefficient of friction combined with low cost make Diamond vulcanized fibre ideal for such uses as tracks for sliding glass doors and windows.



Superior electrical properties. A reason why CDF's Diamond vulcanized fibre is widely used for slot liners in small electric motors and transformers.

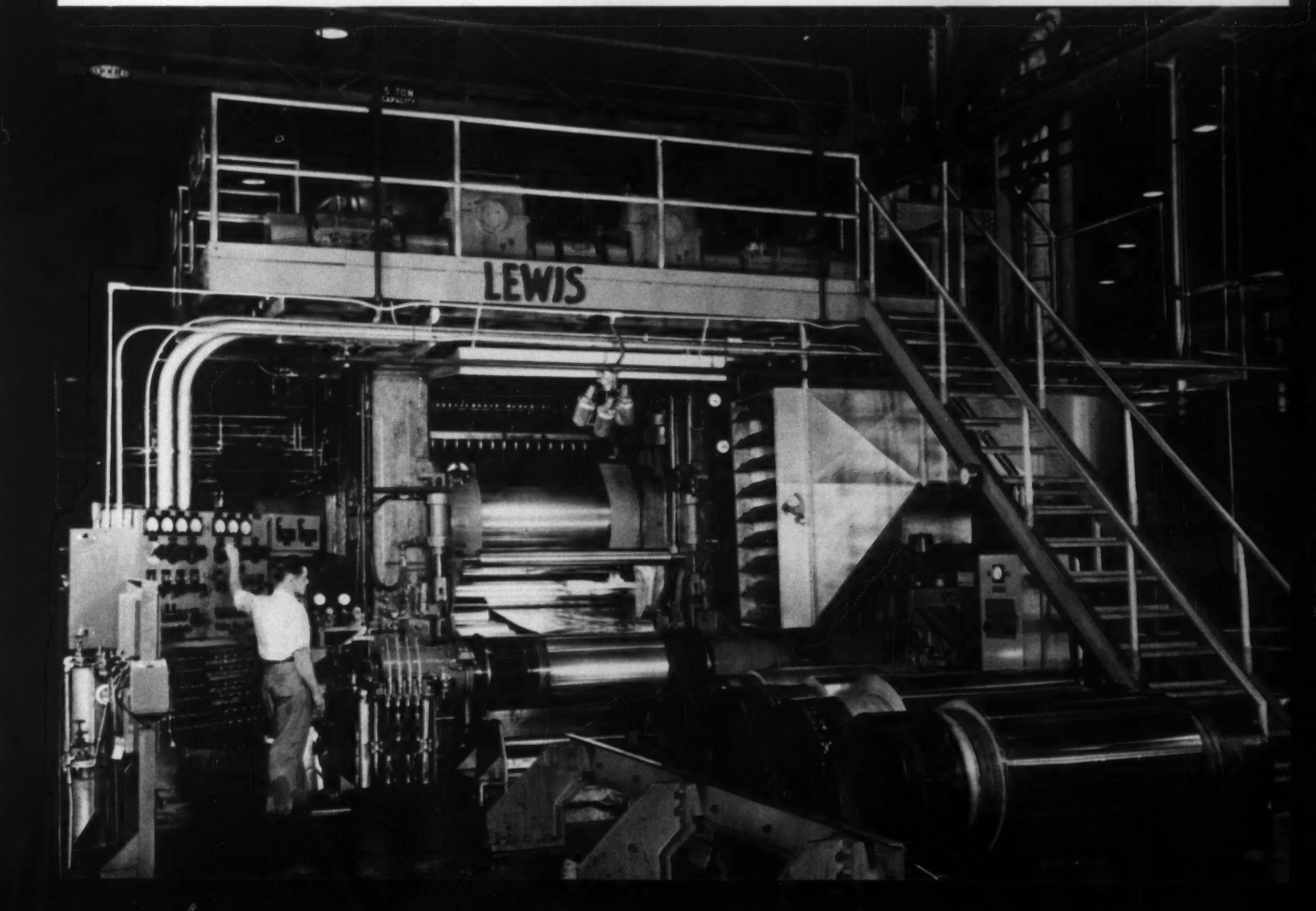


Low cost. Diamond vulcanized fibre helps keep electrical appliance costs low. This food mixer insulator is an example.

BLAW-KNOX

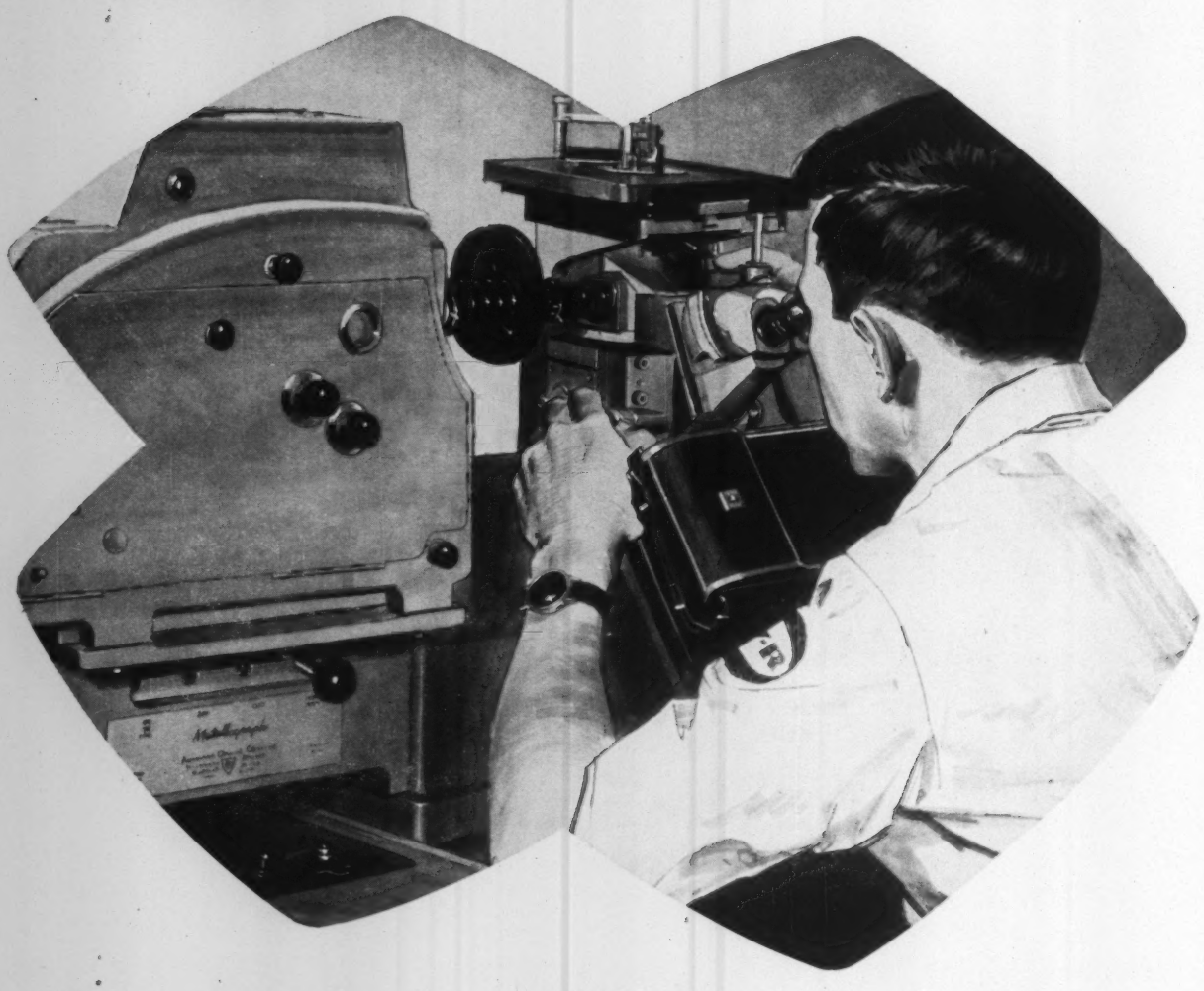
Blaw-Knox designs and builds a full range of aluminum foil mills complete with auxiliary equipment to meet individual requirements. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing, and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

9½ and 34-inch by 60-inch Foil Mill



V-R

CREATING THE METALS THAT SHAPE THE FUTURE



Constant Checking Assures Carbide Consistency

It's no wonder that V-R carbides give consistent performance under any circumstance. Carbide consistency is largely due to the varied and frequent quality checks at every step in production processing. Here, we see a metallograph being used to check grain structure and absence of porosity against rigid standards. Similar checks are made constantly to assure proper hardness, density, and transverse rupture strength. Each and every piece of any V-R grade always will perform the same. Yes, quality control here at V-R is important to you.

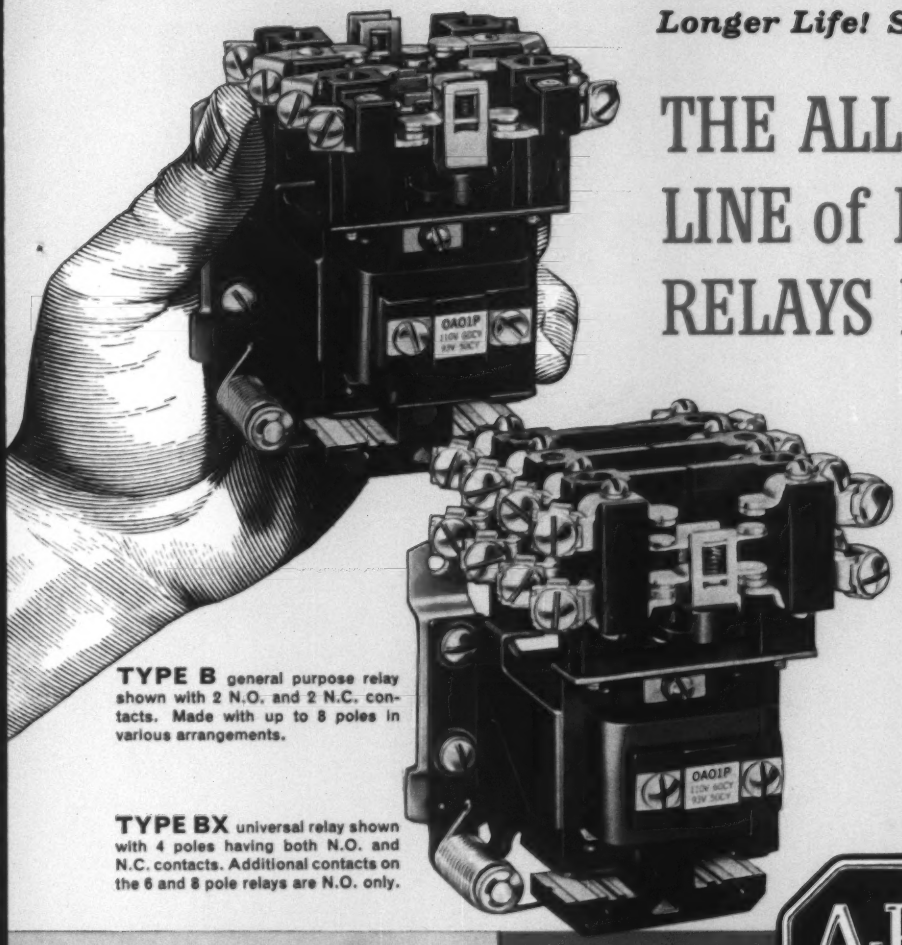
V-R **VASCOLOY-RAMET**

836 MARKET STREET • WAUKEGAN, ILLINOIS

C-801

Longer Life! Superior Dependability!

THE ALLEN-BRADLEY LINE of BULLETIN 700 RELAYS IS COMPLETE!



TYPE B general purpose relay shown with 2 N.O. and 2 N.C. contacts. Made with up to 8 poles in various arrangements.

TYPE BX universal relay shown with 4 poles having both N.O. and N.C. contacts. Additional contacts on the 6 and 8 pole relays are N.O. only.

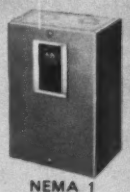
THESE IMPROVEMENTS ARE *IMPORTANT!*

These improved Bulletin 700 Type B and Type BX relays are establishing new standards for relay life and reliability. New design increases mechanical life by *at least 5 times* . . . a new contact motion insures *at least 10 times* greater electrical reliability. Double break, silver contacts never need maintenance, and the new molded coil is impervious to the most severe atmospheric conditions.

These new A-B relays—with their *extra millions of trouble free operations at no increase in price*—are a bargain in the relay field. Write for complete details, today.

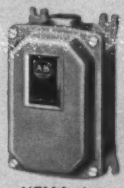
NEW ENCLOSURES

for the Bulletin 700 relays are styled by Brooks Stevens—internationally famous industrial designer. Note the "family" resemblance of these enclosures.



NEMA 1

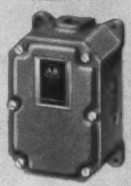
NEMA Type 1 for general purpose applications with wrap-around cover for ready accessibility. It has a "quality" appearance.



NEMA 4

NEMA Type 4 enclosure for applications that require a watertight and weatherproof seal.

NEMA Type 7 enclosure for NEC Class 1, Group D hazardous gas locations.

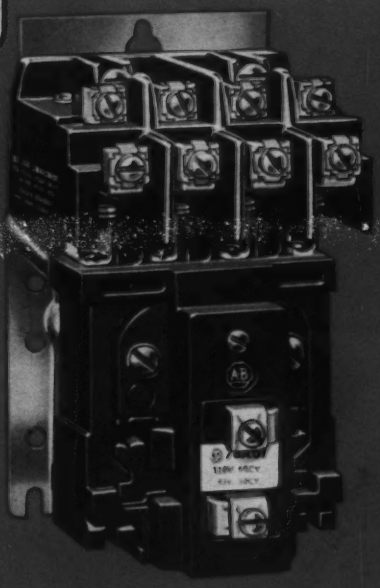


NEMA 7

11-60-M

A-B QUALITY

TYPE BR Bulletin 700 convertible contact relay shown with four poles. Made with up to six poles in line.



No other relay offers such simplicity in changing contacts from N.O. to N.C. or vice versa)—it takes only 60 seconds!

A four pole unit provides any of the contact combinations otherwise available only with five relays of the fixed contact type. You can reduce your relay inventories. In tests, this relay has *proved* it will provide many millions of trouble free operations. Double break, silver contacts never need servicing. Also, each relay can have one or two complete and full rated contacts added to its base—in the field—without increasing space requirements. If you don't know about the Type BR relay, let's get acquainted.

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley, Canada Ltd., Galt, Ontario

QUALITY MOTOR CONTROL

ALLEN-BRADLEY

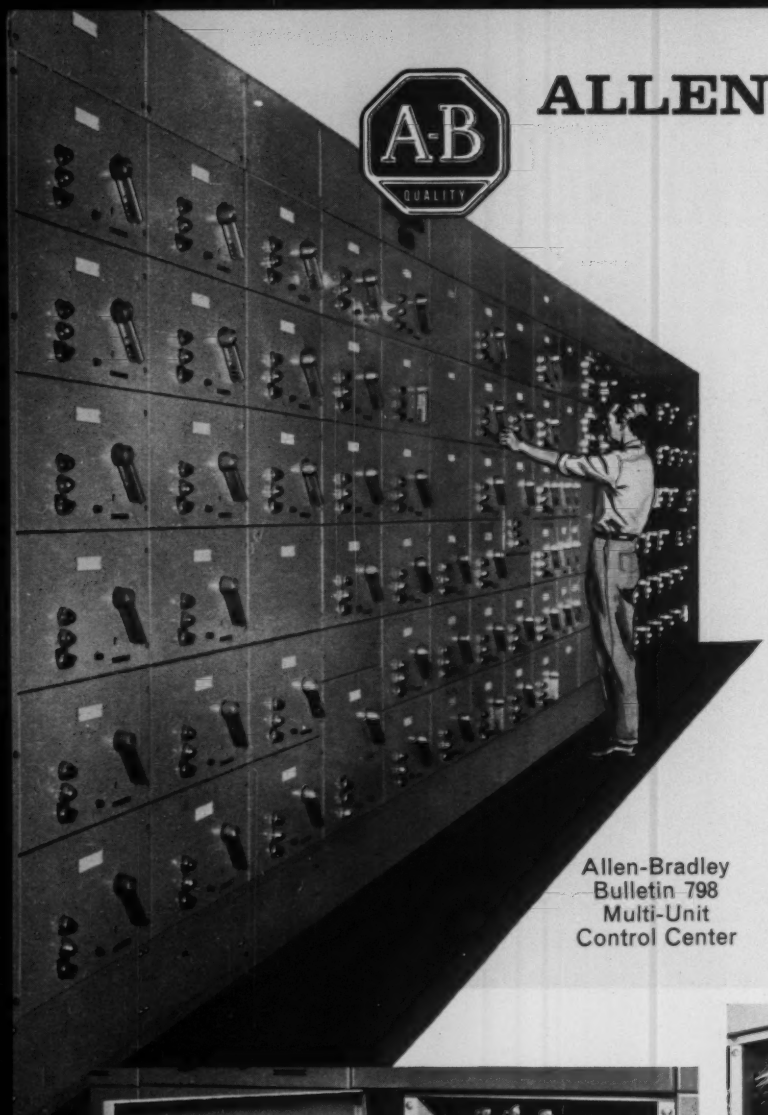
Quality Control Centers

... the mark of a modern plant providing the utmost in reliability, safety, convenience, and lasting beauty

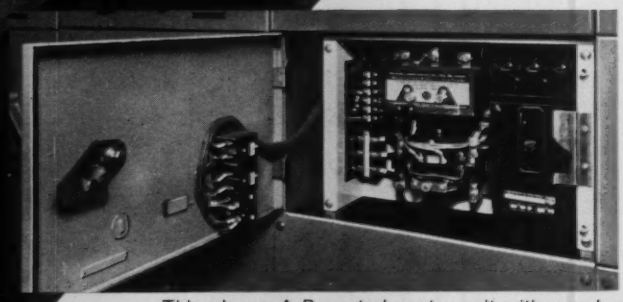
The superior *quality* of Allen-Bradley control centers provides a modern and attractive installation—one that you'll be justly proud to have in your plant. The cost is commensurate with the quality of the workmanship—but you'll never have reason to regret your decision. Furthermore, Allen-Bradley control centers arrive completely wired and tested—and *installed* costs are usually substantially lower than that of individual starters.

The flexibility of A-B control centers makes them readily adaptable to changing needs. Individual units can be added or modified without internal rewiring. In addition, entire sections can be added to meet future plant expansion.

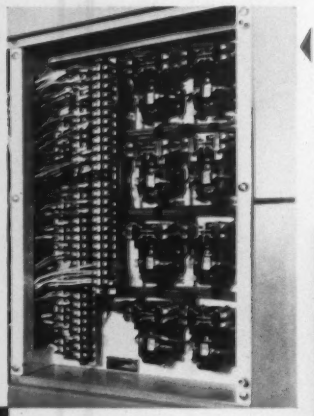
For the finest in control centers, you cannot surpass Allen-Bradley's Bulletin 798. Write today.



Allen-Bradley Bulletin 798 Multi-Unit Control Center

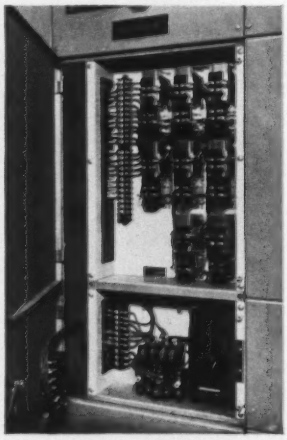


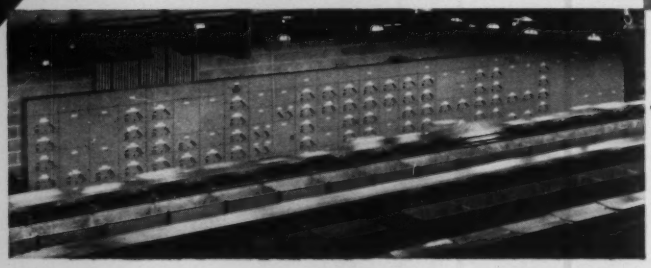
This shows A-B control center unit with popular A-B Bulletin 709 solenoid starter and circuit breaker.



This shows A-B Bulletin 700 control relays mounted in an A-B control center unit.

A-B control centers can be equipped with a wide variety of components. These Bulletin 849 timers are used on an automatic conveyor line.





This huge, 48-foot A-B control center houses 101 A-B Bulletin 709 solenoid motor starters. It is designed to permit an addition containing 50 more Bulletin 709 starters.

ALLEN-BRADLEY

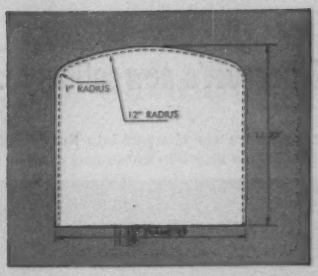
Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. - In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

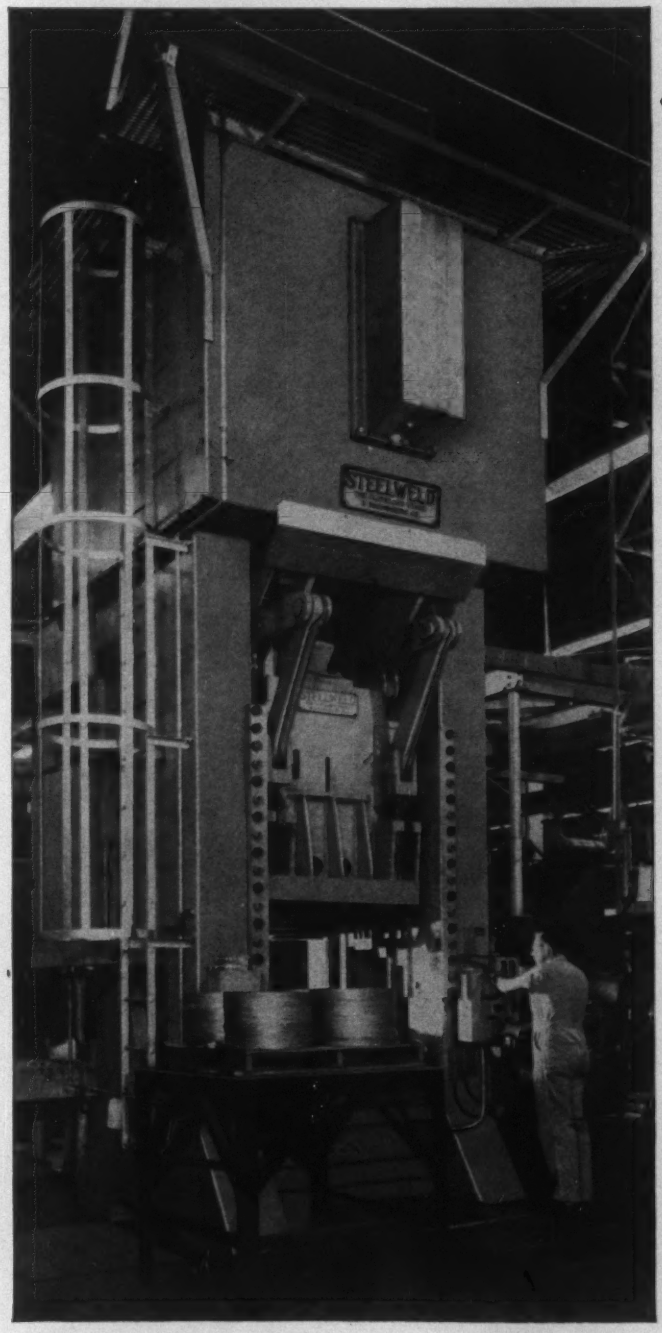
QUALITY MOTOR CONTROL

DEEP-DRAWN SHELLS FORMED IN *SINGLE DRAW* ON STEELWELD SPEED-DRAW PRESS

Draw Is Greater than 50% REDUCTION from Blank Size



This shell is stamped in a single draw from a 22¾ inch diameter steel blank. Material is 0.1644" draw-type steel.



Model D1-400-48-54 Steelweld Double-Action Speed-Draw Press rated 400 tons capacity with 48 x 54 inch slide area.

Some of the great number of shells produced daily. All dimensions are held accurately to specifications and the stampings are smooth and uniform.

A new kind of press with unique, patented toggle-eccentric mechanism stamps shells for air-conditioning units in a single draw from 22¾" dia. blanks to dimensions shown in sketch.

The unusual operating principle of the Speed-Draw Press permits making extra long draws at higher speeds than shallow draws can be made on a standard crank-type press. The deep-draw feature frequently reduces the number of operations required to form a part and often permits operations that are not possible on a standard press. Because of these advantages, parts can normally be produced at a far greater speed on a Steelweld Speed-Draw Press.

Write for free catalog No. 2029

STEELWELD
SPEED-DRAW PRESSES

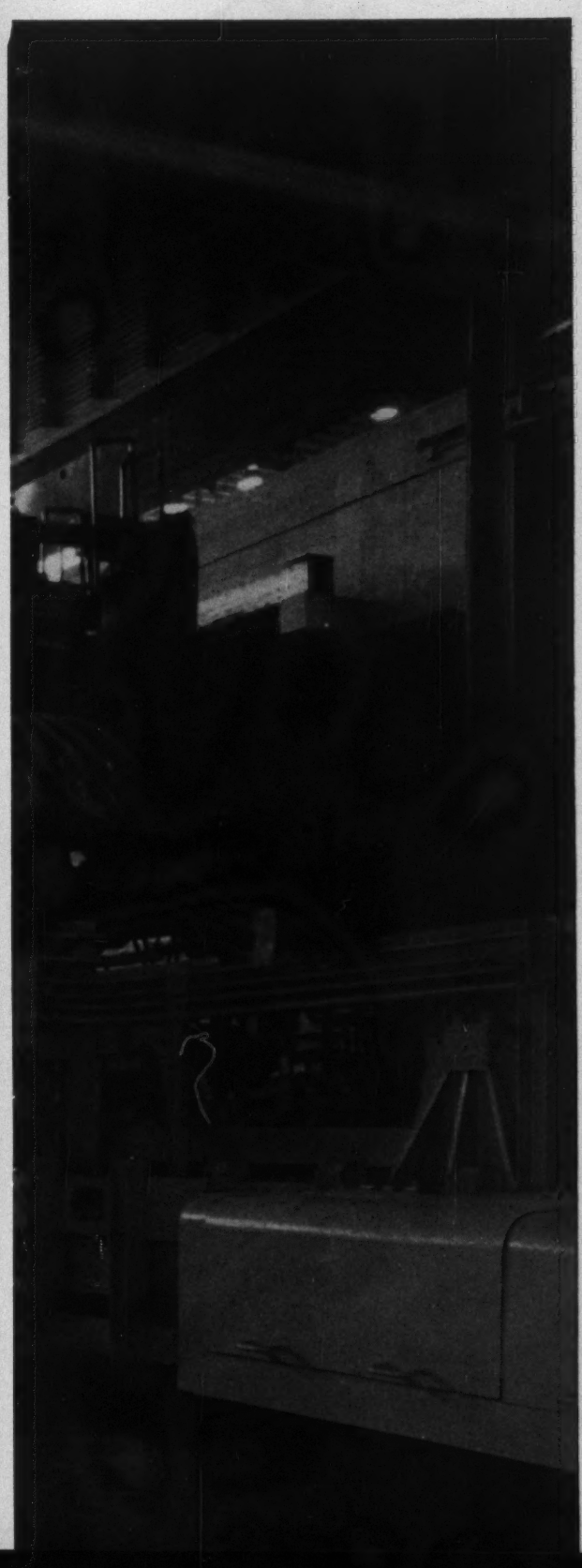
Steelweld Machinery includes: Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4803 E. 280 ST. • WICKLIFFE, OHIO

At Kennecott's new refinery... Twin Heroult Electric Furnaces designed

Copper cathodes are charged into the 13,500 KVA Heroult 90-ton electric arc furnace, one of two at Kennecott Refining's new plant south of Baltimore. American Bridge also fabricated and erected the plant's structural framework.

to keep 16,500-ton per month copper melt on schedule



Kennecott Refining Corporation's electrolytic copper refinery near Baltimore is the country's newest—a showplace of efficiency. One reason: a pair of 90-ton Heroult electric arc furnaces, each rated at 40 tons per hour.

Of nose-tilt design to facilitate launder pouring, they discharge a steady stream of molten copper (2150°) which is used in the horizontal casting of wire bars and the continuous casting of billets. One Heroult is on normal capacity operation while the other is a spare for use during relining, when the pre-heat furnace is down, or when additional production is required.

Copper cathodes are preheated to about 1400°F and door charged into the Heroult arc furnace on a peel arm crane. The three-phase power input utilizing ultra-high speed mechanical positioning for three 20″ electrodes with high-speed sensitive regulators maintains a constant arc above the copper bath for uniform temperature casting.

The two 90-ton Heroult arc furnaces can be tilted 40° forward and 15° backward. They feature mechanically positioned masts and special water-cooled skew-back roof rings that introduce water flow at the critical roof juncture to prevent warpage and burn out.

Whatever your arc-melt problem there is a Heroult electric arc furnace design for you. We've made them from 3 tons to over 200 tons capacity, for both swing roof top charge or door charge operation. They can accommodate induction stirring equipment, and can be designed for duplexing arrangements. And every Heroult is designed for maintenance by your own crew.

American Bridge has a complete electric furnace service that includes new installation, furnace modernization and part replacement. We'll be happy to quote on your building needs, too. Call our nearest office.

USS and Heroult are registered trademarks

American Bridge Division of United States Steel

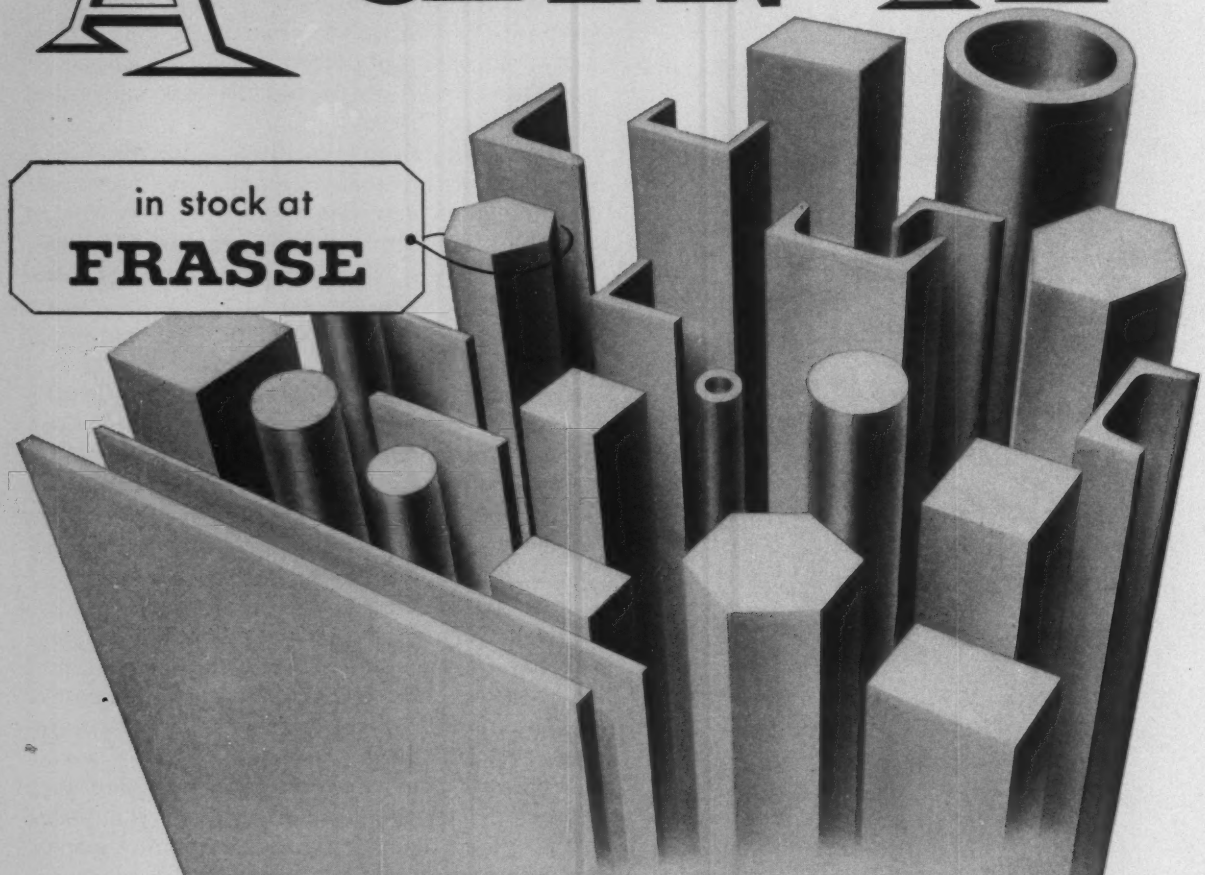
USS

General Offices: 525 William Penn Place, Pittsburgh, Pa. Contracting Offices in New York, Philadelphia, Chicago, San Francisco, and other principal cities.
United States Steel Export Company, New York

This mark tells you a product is made of modern, dependable Steel.

ALUMINUM

in stock at
FRASSE



Regardless of grade, shape or size ...it's likely the aluminum you want can be shipped *immediately from stock by Frasse*. Frasse aluminum inventories are at an all-time peak —every pound of dependable quality... produced to rigid standards by Reynolds.

And, if you wish—Frasse aluminum specialists will gladly help with grade selection . . . or prescribe the most economical method of fabrication. You'll like the *fast delivery* . . . the *uniform quality*... and the *careful handling* your aluminum orders receive at Frasse. Call us whenever you need aluminum.

FRASSE for ALUMINUM

Rod • Bar • Wire • Sheet • Plate • Structurals • Extrusions
Tubing • Holobar • Pipe • Valves • Fittings • Tool and Jig Plate

Peter A. Frasse & Co., Inc.

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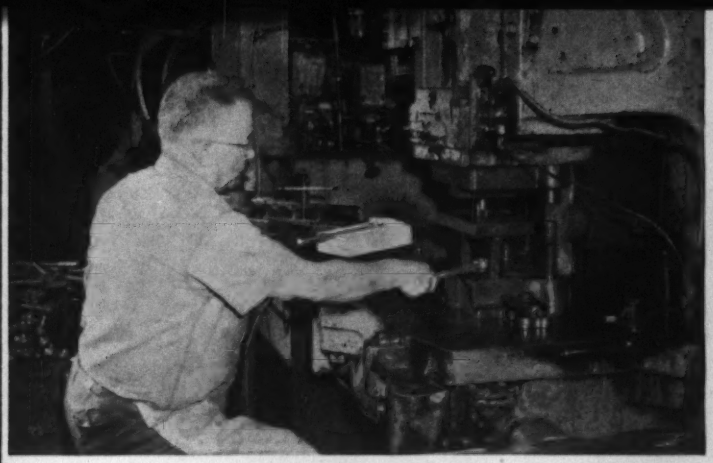


Teeth in ratchet head and socket openings are induction heated for hot forming without tears or ruptures. Over-heating of steel is avoided and decarburization is prevented. Unusual accuracy is attained and the grain structure of the metal remains unbroken.

Completely machined ratchet and socket blanks are heated and quenched in a series of salt baths to develop the proper relationship of toughness and hardness without decarburization or dimensional distortion.

A Push Button World at WILLIAMS

produces

Detachable Socket Wrenches

that have RESERVE STRENGTH for THE TOUGHEST JOBS

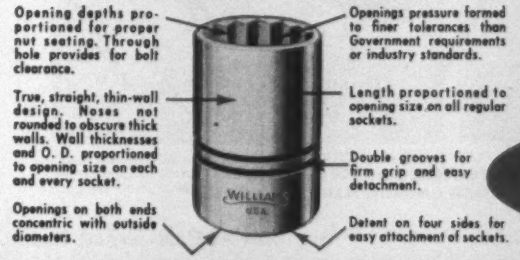
B-52 and S-52 RATCHET FEATURES

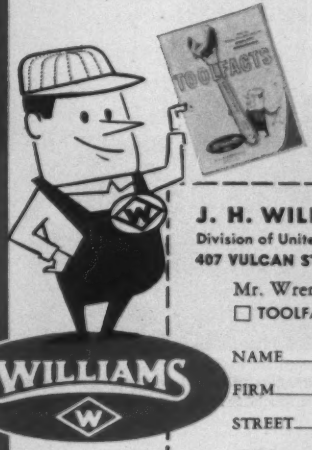
41 teeth give 82 tooth action requiring less than 4½° swing of handle for complete nut rotation.
S-52 "SUPERRATCHET" PATENTED
The harder the pull on the handle, the more teeth that come in contact.
Entire ratchet 50% stronger than U.S. Government requirements.
Length directly proportioned to weight distribution for ideal balance, comfort and leverage.
Soft knurling provides safe, non-irritating grip.

RETAINING RING
NEW... Four-Winged, Non-Slip Shifter Design
Rugged construction. No one part bears bulk of stress.
NEW... Single Unit Construction
Easily removed for cleaning, servicing and replacing
Stresses evenly distributed throughout entire mechanism.

The unique combination of the latest automated equipment and design "know-how" produces a complete line of rugged, detachable socket wrenches which "bear up" under *every* stress condition encountered. Improved grain structure and precisely controlled heat-treating build up an unusual resistance to metal fatigue. These reserves of strength are hidden but guaranteed qualities built into all Williams' wrenches.

DETACHABLE SOCKET FEATURES


Opening depths proportioned for proper nut seating. Through hole provides for bolt clearance.
True, straight, thin-wall design. Noses not rounded to obscure thick walls. Wall thicknesses and O. D. proportioned to opening size on each and every socket.
Openings on both ends concentric with outside diameters.
Openings pressure formed to finer tolerances than Government requirements or industry standards.
Length proportioned to opening size on all regular sockets.
Double grooves for firm grip and easy detachment.
Detent on four sides for easy attachment of sockets.



MR. WRENCH SAYS: "Get the Facts ... get TOOLFACTS ... new 24 page booklet on how to select, use and care for Quality Wrenches."

J. H. WILLIAMS & CO.
Division of United-Greenfield Corporation
407 VULCAN STREET, BUFFALO 7, N. Y.

Mr. Wrench: Please send me your new
☐ TOOLFACTS Booklet ☐ ILLUSTRATED CATALOG No. 304

NAME_____ TITLE_____
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part of a COMPLETE efficiency-proved line . . .

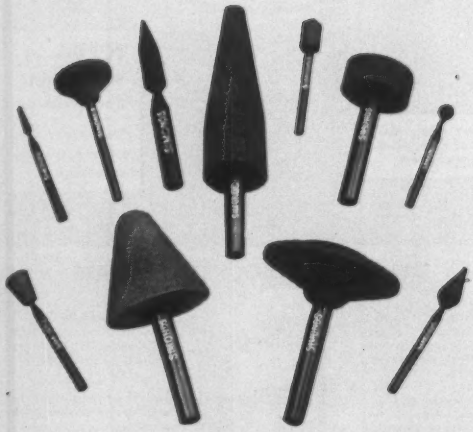
SIMONDS MOUNTED WHEELS

here's why they're your best buy for BETTER GRINDING

Consistently superior performance because they're made in the right grain and grade combinations for the jobs they have to do. *Mechanical accuracy* you can count on for true concentricity, precise wheel shape and top cutting efficiency. *Stainless steel mandrels securely bonded to wheel* . . . specially fluted . . . guaranteed not to come loose or pull off.

The COMPLETE line for complete satisfaction. Grinding wheels are our business . . . and our business is to help your business with top quality grinding wheels including Diamond Wheels, man-made and natural . . . precision grinding wheels; centerless, cylindrical, etc. . . . abrasive segments . . . snagging wheels . . . Double XX weld grinding wheels, etc. Just name what you need and your Simonds distributor will supply it.

Write for Mounted Wheel Catalog ESA-67



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Division of Simonds Saw and Steel Co.
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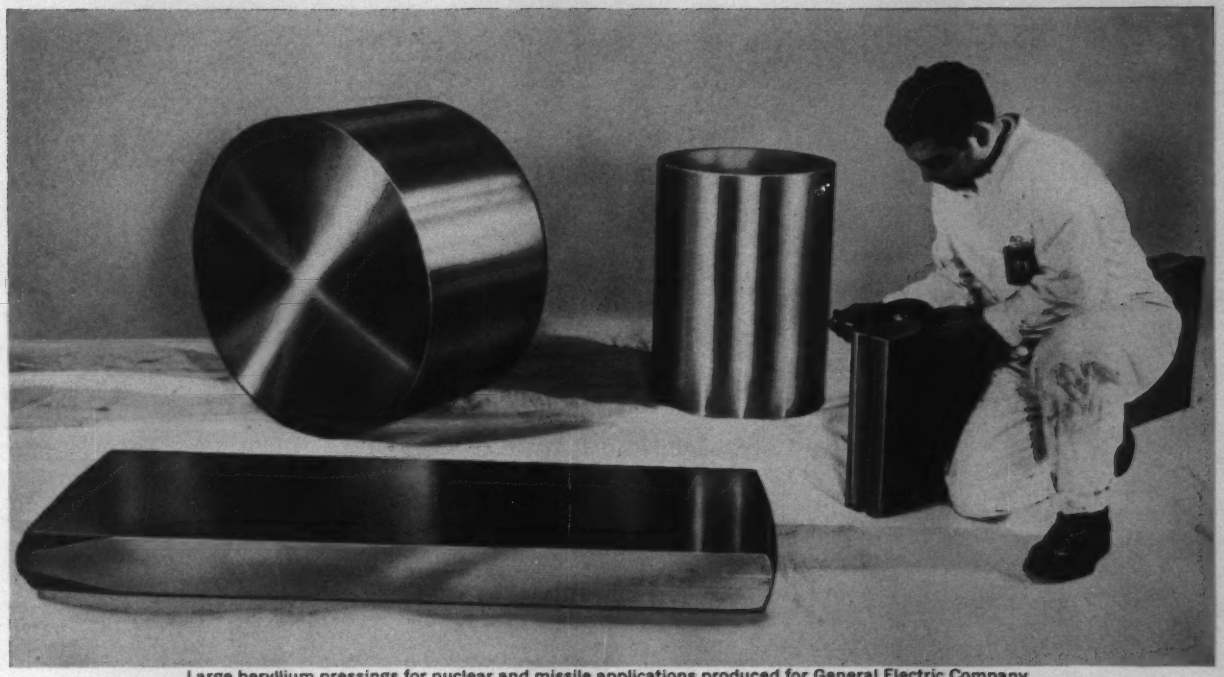


Large beryllium pressings for nuclear and missile applications produced for General Electric Company.

BERYLCO-Setting the Pace in Beryllium by Putting Proven Research Principles into Production

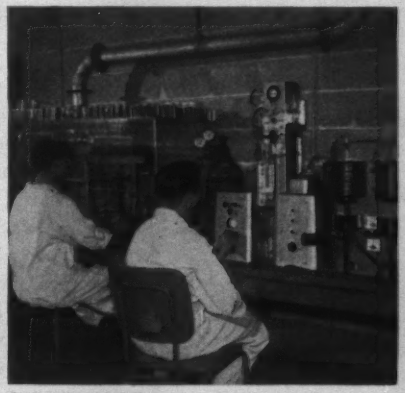
BERYLCO's consistent research leadership is simplifying the transition from laboratory to production line for aircraft and missile makers using beryllium. Chemical and spectrographic analysis, physical and mechanical property research, and pilot plant studies help produce rigid quality control procedures as well as a constant source of new testing data. BERYLCO can also supply an experienced staff of field and plant technicians to assist you in your own product development, or product re-design, with beryllium. Call them in when you first start thinking about the advantages beryllium can add to your product's performance. Their ideas may help you eliminate some of those time-consuming steps between testing and production.

BERYLCO®

THE BERYLLIUM CORPORATION

Reading, Pennsylvania

Spectrographic analysis of BERLYCO beryllium is important in controlling quality and assuring proper composition.



Conductormetric carbon determination equipment is used to assure that both BERYLCO's and government specifications are met.

High temperature beryllium research is another segment of BERYLCO service that can speed your product development.

A message from G. Washington

On January 8, 1790, the First President of the United States said, "To be prepared for war is one of the most effective means of preserving peace."

This mark tells you a product is made of modern, dependable Steel.

The USS George Washington, built by Electric Boat Division, General Dynamics Corporation, is the Navy's first mobile ballistic missile base. Cradled inside its steel hull will be 16 business-like Polaris missiles. This new, atomic-powered submarine dives or surfaces as gracefully as a porpoise and it speeds along in excess of twenty knots.

The Polaris Fleet Ballistic Missile (FBM) will be a deterrent weapon. It has a range of 1,200 miles, and travels at speeds up to 10,000 mph. Approximate time from submarine to target: less than 20 minutes.

Compressed air will eject the Polaris. The missile's solid-fuel engines ignite with a roar as it leaps clear

of the water. This new launching method protects the sub from rocket back-blast, and makes it possible for the George Washington to pump a full load of these nuclear-armed missiles into target in minutes.

As part of the Navy-industry team that developed the Polaris and the George Washington, National Tube supplied USS National Seamless Pipe and Tubes, in both carbon and stainless steels, and USS National Seamless Steel Cylinders for air and oxygen systems. If you have a problem related to the field of pipe, or tubular applications, write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. *USS and National are registered trademarks*

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

Put materials handling on a PRODUCTION LINE BASIS with a UNIT-COLES mobile crane

This 12-ton Model S-1210 mobile crane is moving tractor parts from trailer to storage area at the International Harvester Plant, Chicago.

WORLD'S SAFEST CRANE

One of many UNIT-COLES safety devices is this safe load indicator which automatically warns operator of dangerous load condition, then instantaneously "stops and holds" boom and load-hoist motions.

Mounted on a self-propelled carrier, a UNIT-COLES mobile crane travels quickly, indoors or outdoors, from one end of the plant to the other . . . handles materials flow from start to finish with production line efficiency. A cantilever-type boom gives *this crane* lower-than-usual overall height, making it ideal for in-plant operation and for unloading or loading motor or rail carriers. Tail swing and turning radius are shortest of any full-circle revolving crane, providing easy maneuverability in congested areas. Instinctive "left-for-left" and "right-for-right" steering, regardless of direction cab is facing in relation to chassis, *plus* independent swing and travel, simplifies travel along narrow aisles.

Load-hoist, swing, and boom-hoist are independently powered by separate electric motors with an infinite range of speeds. At the touch of a lever the operator raises or lowers a load quickly, or inches it so slowly that it barely appears to move. And, with boom-hoist independent, he can boom up or down during swing without pausing.

Operating a UNIT-COLES is really simple — no gears to shift, no clutches to move. Inexperienced men have become competent operators within a few hours. The man in the cab feels safe and secure, too, knowing that his UNIT-COLES is fitted with exclusive safety devices like the automatic safe load indicator, self-resetting limit switches on load-hoist and boom-hoist, and fail-safe automatic braking, with "dead man control", on all crane motions.

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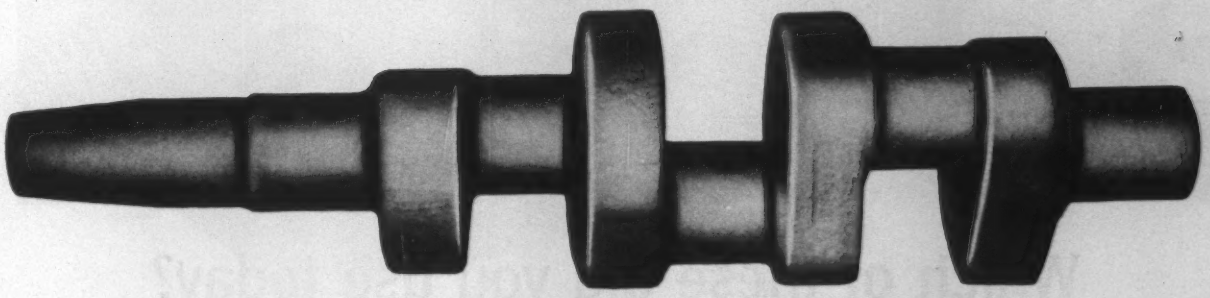

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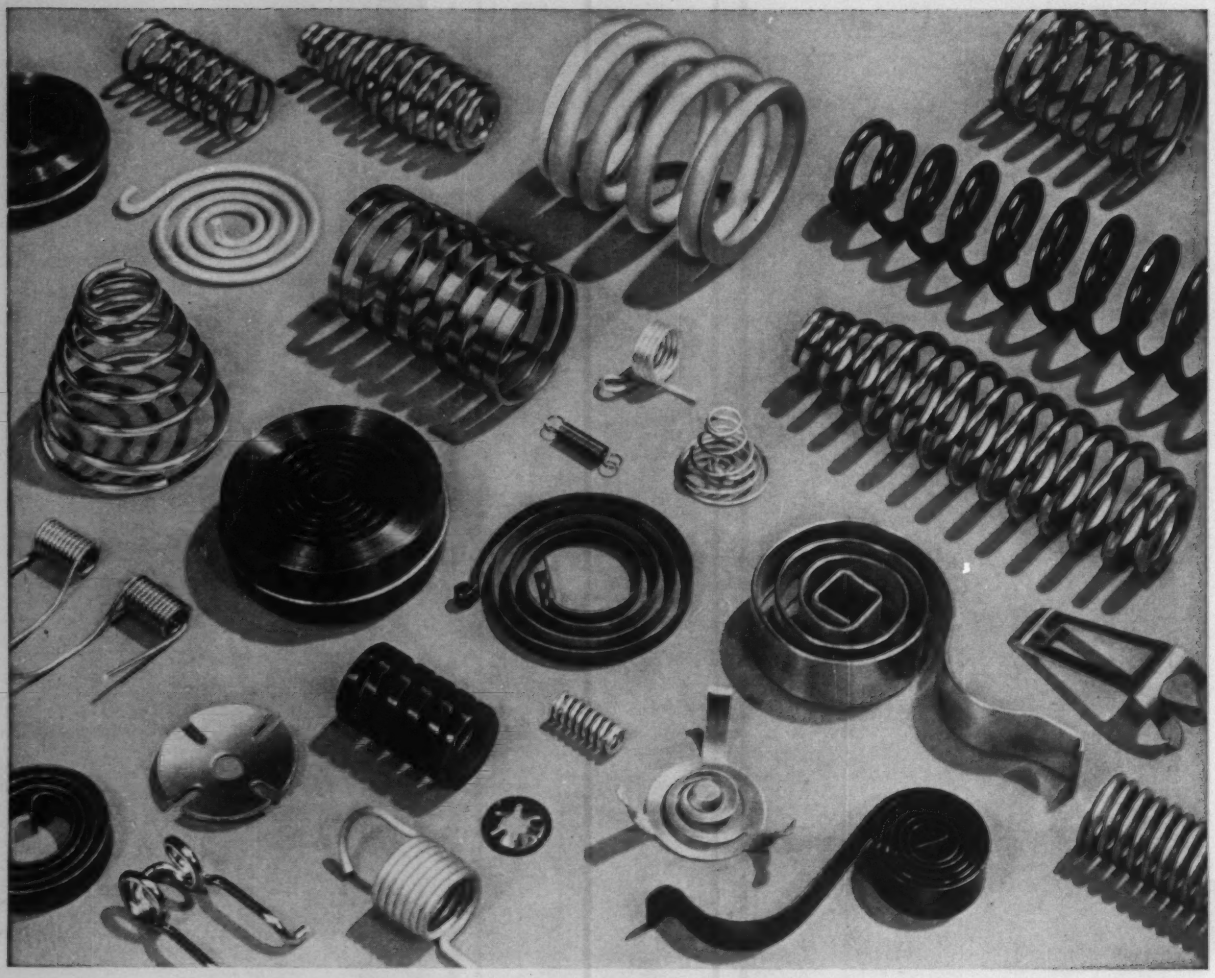

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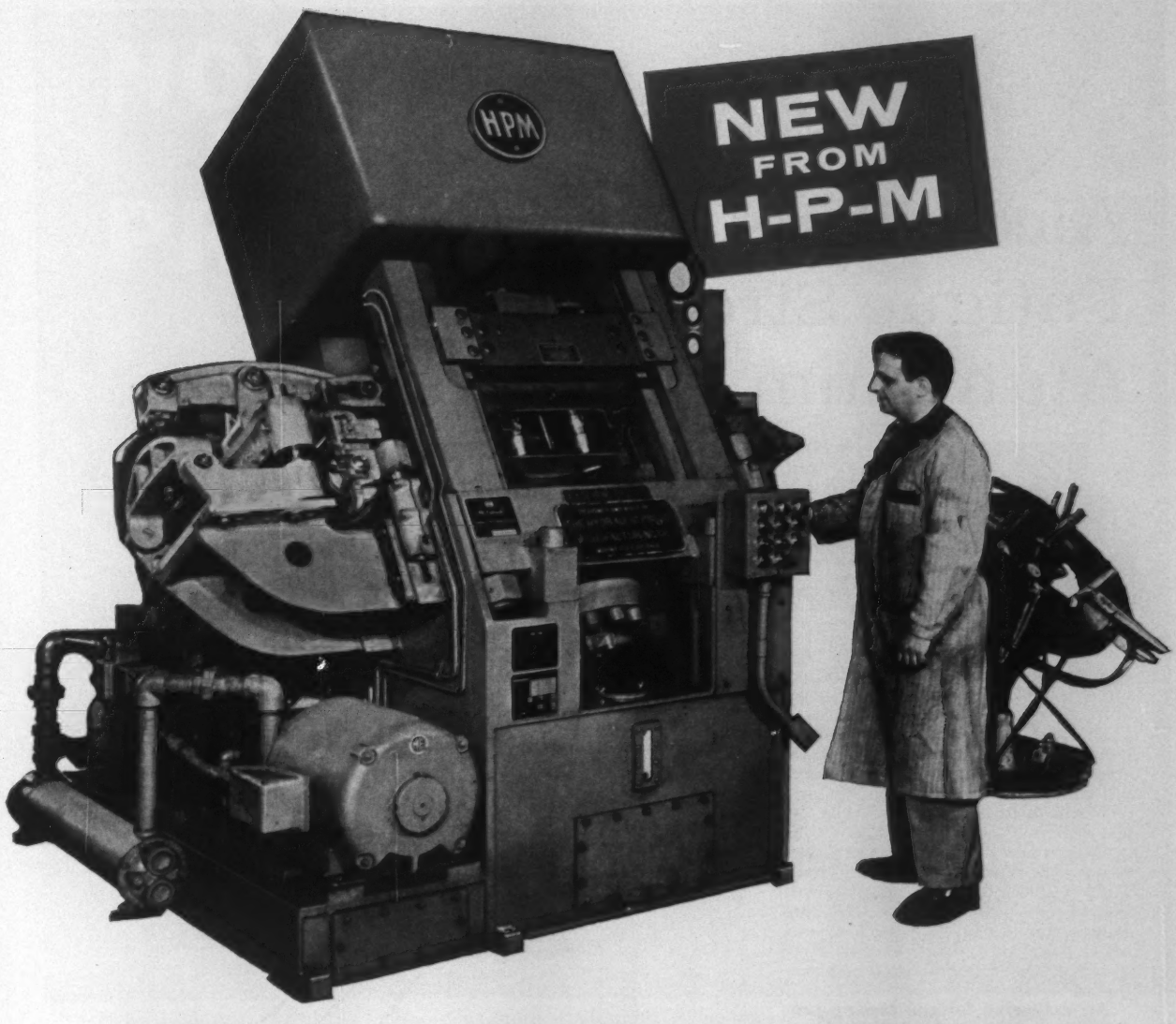

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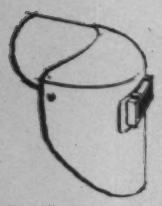

NO. 8 OF A SERIES

"How to Design Welded Aluminum Structures"

Alcoa Tests Determine Fatigue Strength of Aluminum Alloy Weldments

Mr. Harry N. Hill, *Engineering Design Division Chief, Alcoa Research Laboratories, Aluminum Company of America, reports findings presented at the 1959 annual meeting of the American Society of Civil Engineers.*

In previous articles in this series, we have talked about the behavior of aluminum alloy weldments under a single load application. We have seen how the yield strength, tensile strength and compressive strength are influenced by the location and orientation of the weld—that is, by the design.

Design and configuration are even more important when a weldment must withstand many repetitions of loading without fracture. Fatigue failures have a habit of seeking out local regions of high stress. Frequently, these regions are not suspected.

An extensive fatigue testing program is being conducted at Alcoa Research Laboratories to evaluate the effect of various joint configurations on fatigue strength. Two general conclusions can be drawn from results of tests to date:

1. *The configuration of a welded joint has much greater influence on its fatigue strength than does the alloy of which it is made.*

2. *Fatigue strength is seriously impaired by abrupt changes in section and eccentricities that produce local bending.*

Figure 1 shows the results of fatigue tests of transverse butt welds in a high-strength aluminum-magnesium alloy. In these tests the stress in a cycle varied from zero to a maximum tension and back to zero. Even though the weld beads were reasonably smooth, the fatigue strength was materially improved by dressing the weld bead smooth with the surface of the plate.

More frequently than not, service loads consist of a fluctuating "live" load superimposed on a static "dead" load. In such cases the minimum stress in the cycle is something greater than zero. Fatigue strength for this kind of repeated loading is increased, as shown in Figure 2.

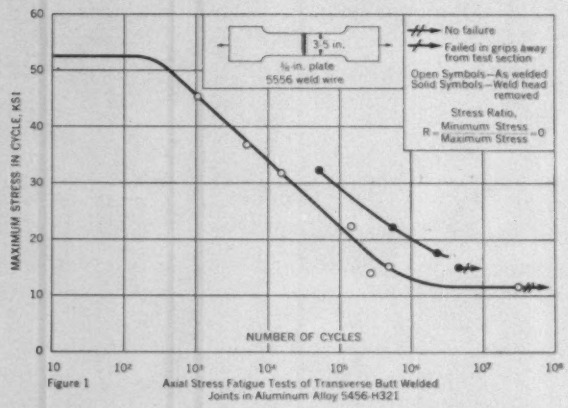
MAXIMUM STRESS IN CYCLE, KSI
NUMBER OF CYCLES
3.5 in.
½ in. plate
5556 weld wire
No failure
Failed in grips away from test section
Open Symbols—As welded
Solid Symbols—Weld head removed
Stress Ratio, R = Minimum Stress / Maximum Stress = 0

Figure 1 Axial Stress Fatigue Tests of Transverse Butt Welded Joints in Aluminum Alloy 5456-H321

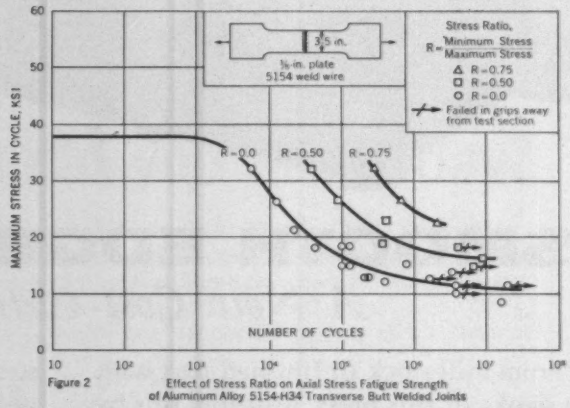

Figure 2 Effect of Stress Ratio on Axial Stress Fatigue Strength of Aluminum Alloy 5154-H34 Transverse Butt Welded Joints

This article concludes the series. We hope the material presented has been helpful to those concerned with designing welded aluminum alloy structures. Much research work still remains to be done, so the program at Alcoa Research Laboratories will continue in the future.

For top-quality aluminum welding products such as consumable electrodes, welding and brazing rods and fluxes, and solder and soldering fluxes, contact your nearest Alcoa sales office. For more complete information on "Designing Welded Aluminum Structures," write Aluminum Company of America, 1761-K Alcoa Building, Pittsburgh 19, Pa.

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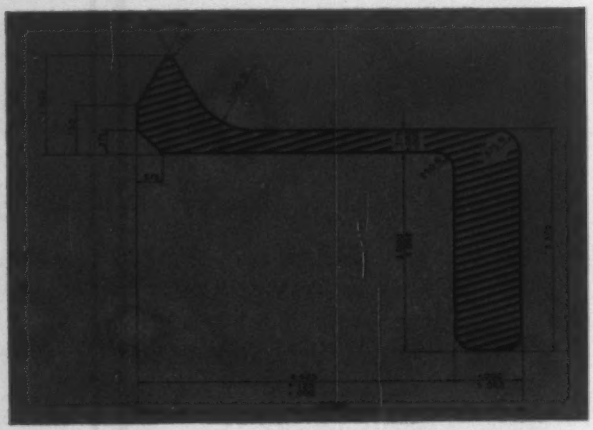

Yale's Design Engineers were concerned with possible bucking of the web in the channel of their largest truck mast assembly. Connors furnished two half sections to be continuously welded in the center. The knob furnished sufficient surface to insure a perfect weld and acted as a stiffening rib without the necessity of wasting steel where it is not needed.

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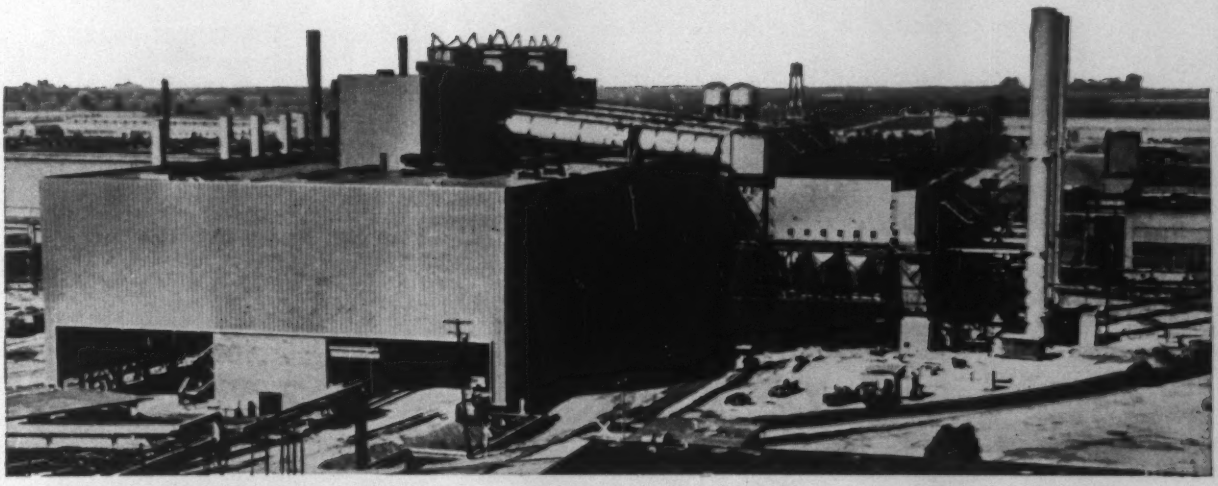

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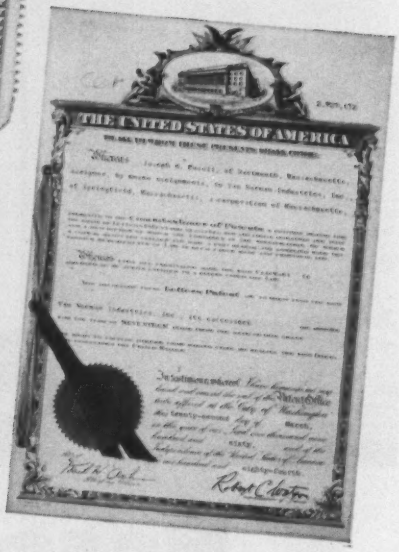

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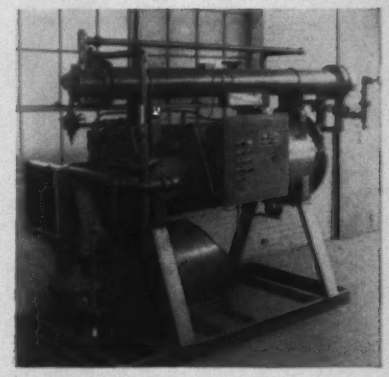

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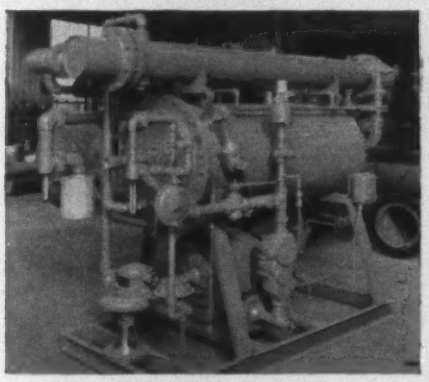

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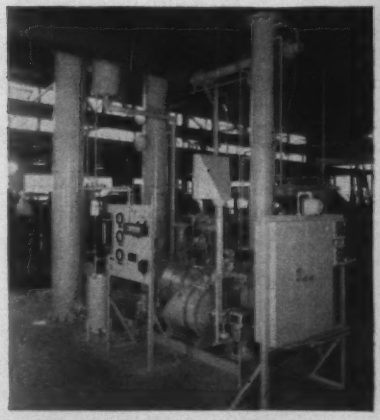

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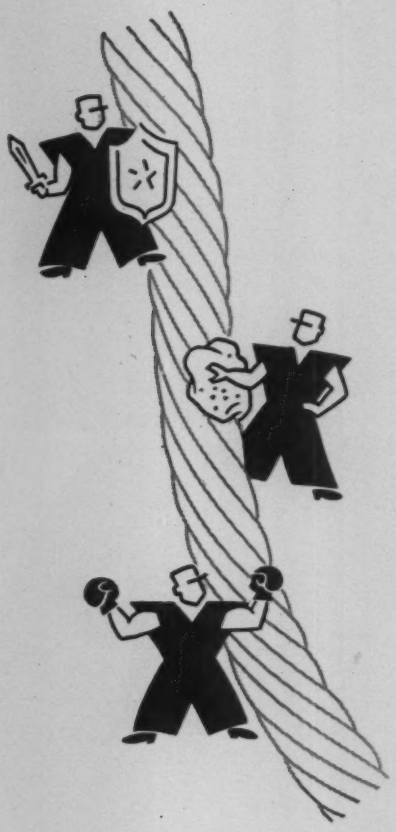

First — because it's made of *extra* improved plow steel — Double Gray-X has *extra* high breaking strength (15% higher than the catalog breaking strength of non-premium ropes of the same construction). Second — due to Wickwire's new wire drawing process — Double Gray-X gives *extra* long service. Double Gray-X has:

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The use of molybdenum disulphide in the wire drawing results in a shield several molecules thick which lubricates the individual wires and prevents them from grinding against each other when the rope operates. Less internal friction means more rope life.

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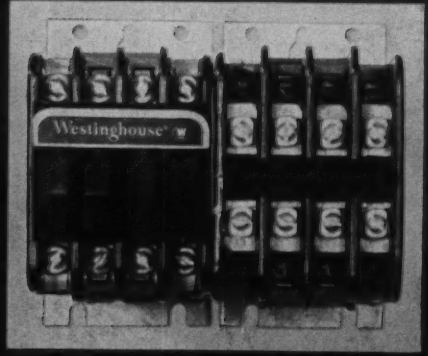

Here's the new Westinghouse relay that cuts the control panel space requirements as much as 50%. Specifically designed for use on automated machine tools, this relay is smaller than any other similar unit available. Relays can be butted against each other in banks. What's more, both 4 and 8 pole frames have the same mounting dimensions, occupy the same panel area, and can be mounted adjacent to each other without additional electrical clearances. ■ Wiring a panel is easier, too. Relay terminals are all readily front accessible. Each of these clamp type connections has a wire stop . . . installation is faster and costs less. You actually save more than 20% over outdated relays. ■ This new relay has load rating of 6 amps, 300 volts a-c—found by experience to be ideal for most of the machine tools now being designed. ■ Want more information? Contact your nearest Westinghouse representative or write: Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa. Remember: You can be sure if it's Westinghouse.

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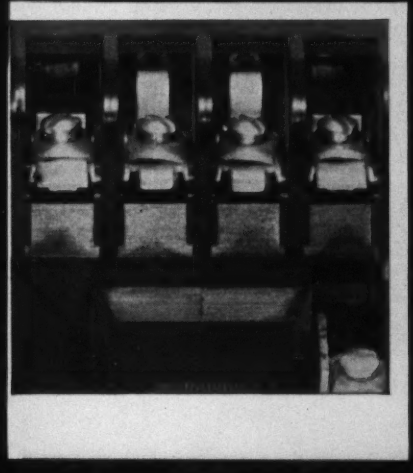

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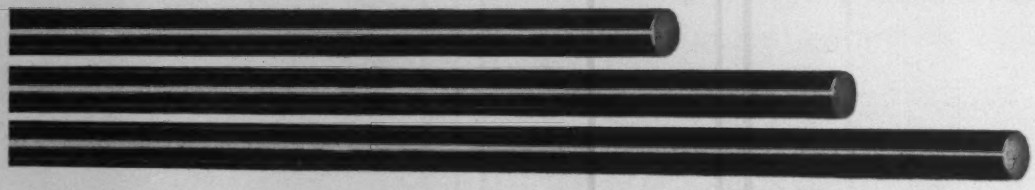

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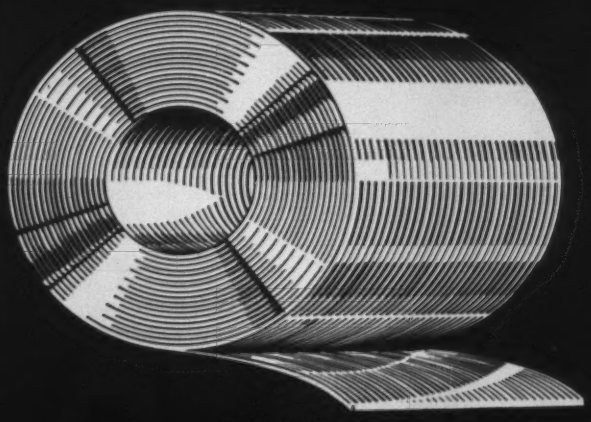

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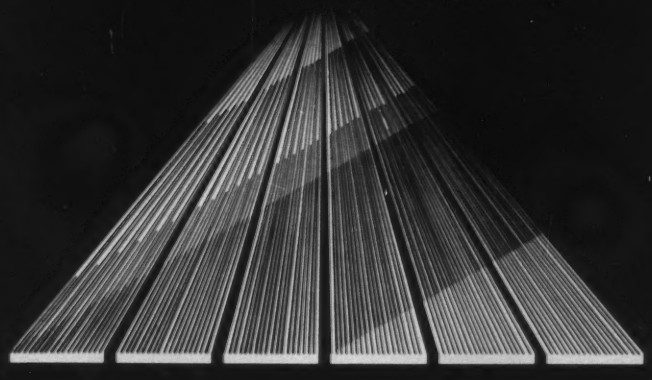

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What was done? In seeking the solution to this problem, Amana consulted their Standard Oil lubrication specialist who recommended STANOIL for this service. STANOIL Industrial Oil is a top quality, first-line industrial lubricating and hydraulic oil. It will provide excellent service in many different applications. And when tested by Amana, STANOIL proved perfect for use.

What has happened? Since STANOIL was first put to work at Amana, it has performed for extended periods of time without foaming or oxidation, lengthening the time between drainings and improving press operation. As a result of this record, STANOIL has been adopted for use on other production equipment, together with Standard's RYKON Greases and SUPERLA Soluble Oil.

What you can do: To get help in solving your lubrication problems and to learn more about STANOIL Industrial Oils, simply call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Production manager Neal Stewart reviews Amana's maintenance expense reductions with Standard's Jess Nelson.

IMPROVES PRODUCTION
REDUCES MAINTENANCE

Smooths operation of 600 ton hydraulic press

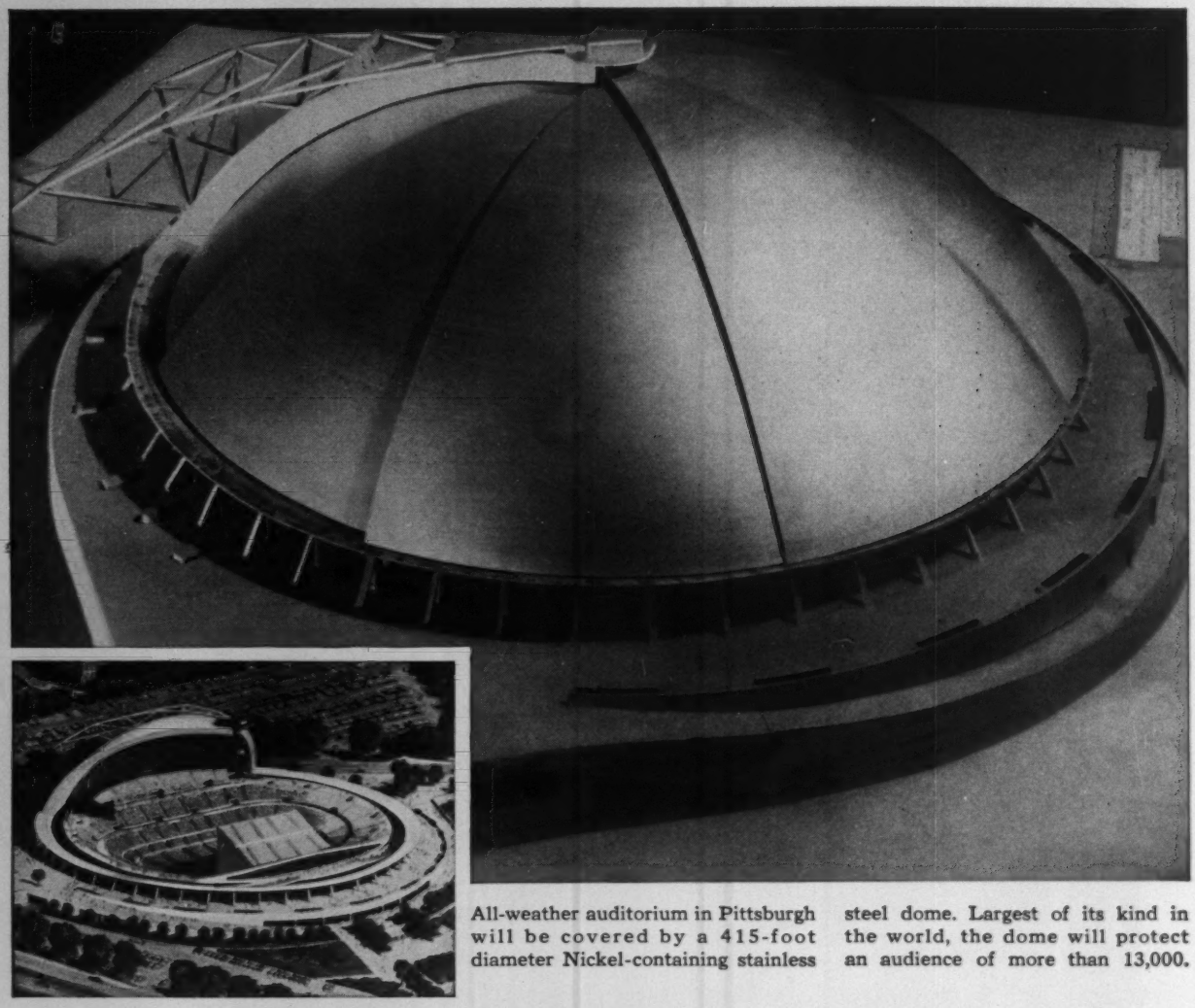
You expect more from STANDARD and you get it!

Quick facts about

STANOIL Industrial Oil

- Antioxidant gives oil resistance to chemical change, minimizes deposits.
- Inhibitor "plates out" on metal surfaces, prevents corrosion.
- Receives special refining to eliminate emulsion problems. Contains additive to minimize foaming.
- High viscosity index. Resists temperature change.

Standard's Jess Nelson (far left) and Gene Maske (back to camera) discuss performance of the Verson Press with Leonard Rettig, Amana's plant maintenance superintendent. Jess, who is District Engineer for Standard, is a specialist in this kind of operation. He has an engineering degree from the University of Iowa, and has also graduated from the Standard Oil Sales Engineering School.



All-weather auditorium in Pittsburgh will be covered by a 415-foot diameter Nickel-containing stainless steel dome. Largest of its kind in the world, the dome will protect an audience of more than 13,000.

"Push-button umbrella roof" of stainless steel gives Pittsburgh a new all-weather auditorium

Watching a play or listening to music under the stars heightens the enjoyment. That is, until a passing shower comes along to wash out the fun. But now comes a new idea in auditoriums. In this one, an umbrella roof of Nickel-containing stainless steel will close at the first drops of rain—and on with the show.

It's a simple concept, but a daring one. Eight huge sections nest together when the dome is open. Push a button, and six of these sections glide quietly together around an outside track.

They looked into all sorts of sheathing materials in designing the dome before choosing stainless – a Nickel-containing stainless steel.

For stainless with Nickel in it is one of the most weatherproof metals there is. It is corrosion-resisting all the way through – in salt air as well as industrial atmospheres. What's more, it's virtually self-cleaning – rainfall alone keeps this metal clean.

No wonder you see Nickel-containing stainless wherever strength, long life and handsome appearance are called for! Not only in buildings – inside and out – but everywhere you look.

Suggest something to you? Can stainless help you solve a problem involving corrosion, stress, appearance, temperature extremes? The way to find out is to write us. We'll see if Nickel-containing stainless steel – or some other nickel alloy – may be just what you're looking for.

THE INTERNATIONAL NICKEL COMPANY, INC.

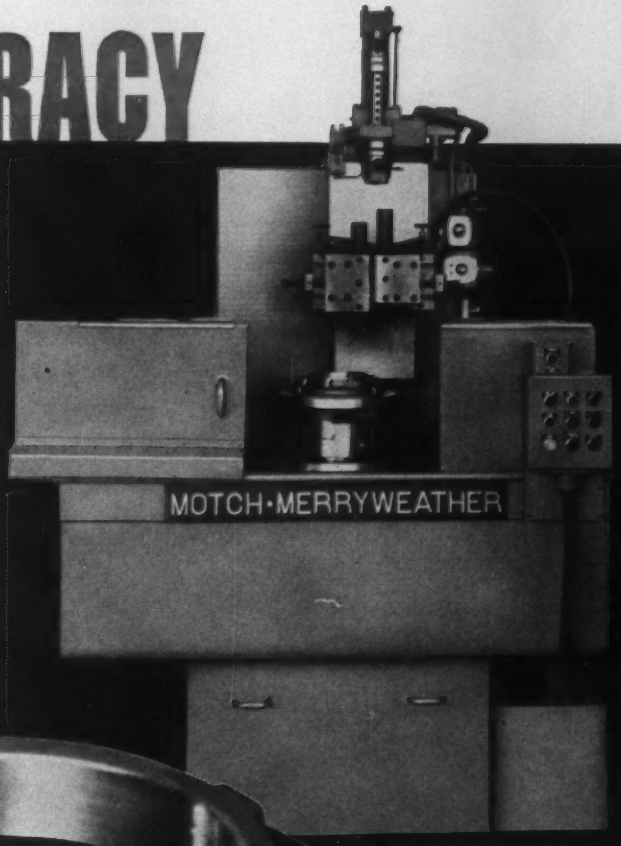
67 Wall Street INCO New York 5, N. Y.

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

GREATER TURNING ACCURACY

HIGH SPEED PRODUCTION with tolerances held to .0002 in. is achieved at the Axle Division of **EATON MANUFACTURING COMPANY**, Cleveland, on finish turning the 7.388 in. pilot diameter and boring the 6.378 in. inside diameter of a 2-speed drive gear for truck axles. Furthermore, on the amazing new **MOTCH & MERRYWEATHER VERTICAL TURNER** cycle time was held to 45 seconds. Greater rigidity at the spindle, greater turning power, fully automatic control of the cutting tool is the answer. For production speed with accuracy you just can't beat the Motch & Merryweather **VERTICAL TURNERS!**



RIGID CAST COLUMN HOLDS TOOL POSITION ACCURATELY

ALL HYDRAULICS EXTERNALLY MOUNTED

TOOL SLIDES MOUNTED ON HARDENED AND GROUND WAYS

TOOL POSITIONS EASILY CHANGED

TREMENDOUS TURNING POWER AT THE SPINDLE

SPINDLE RUN-OUT HELD TO .0002"

HAND-HIGH CONTROLS

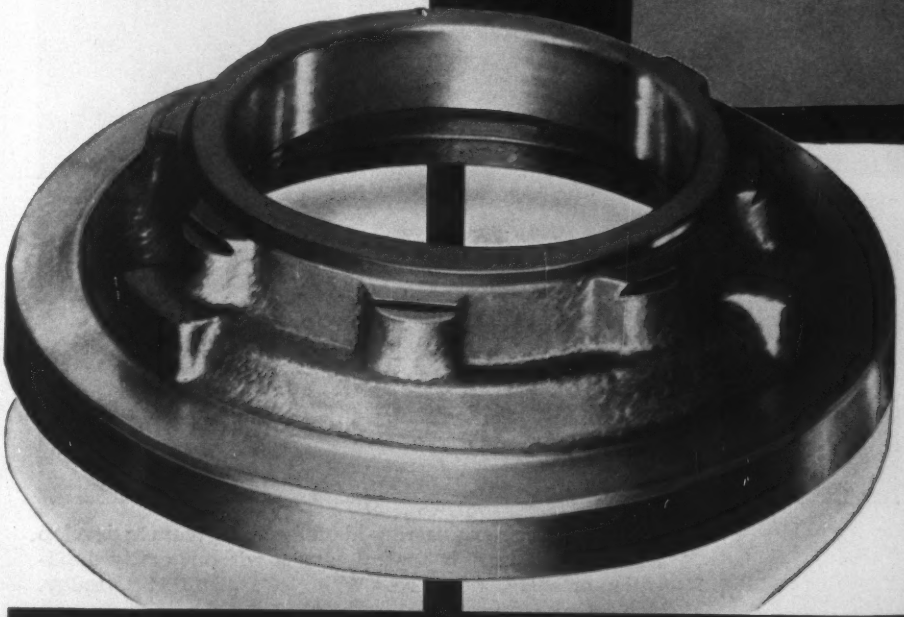
PUSH-BUTTON CHUCKING

CHIPS STAY CLEAR FOR EASY REMOVAL

SIMPLE, AUTOMATIC, SEQUENTIAL PROGRAMING

BASES OF HEAVY INTERNALLY-RIBBED CAST IRON OCCUPY 50% LESS FLOOR AREA

ALL COMPONENTS CAN BE ASSEMBLED AS DESIRED OR CHANGED AT WILL



MOTCH AND MERRYWEATHER

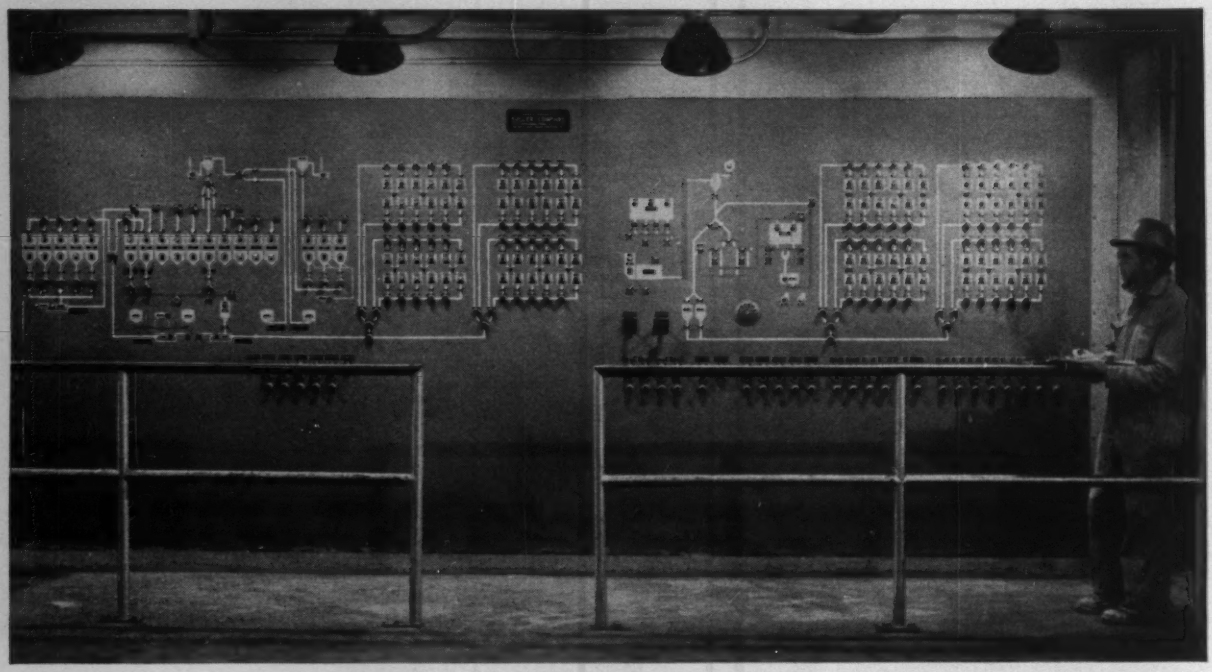
1250 East 222nd Street CLEVELAND 17, OHIO

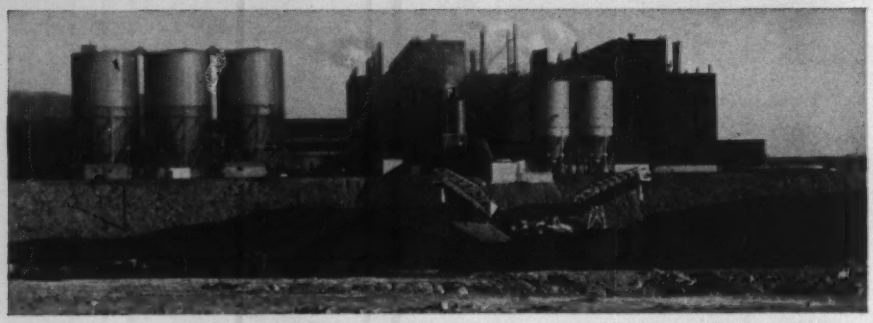
Check the facts! Learn how the Vertical Turner, custom-assembled from production-made components to effect huge savings in capital investment, also makes great savings through improved accuracy and higher production rates. Write today for catalog.

More "PAY-DIRT" With Fuller Panels In Control

One man on watch—and a Fuller Control Panel in control. Result: the flow of bulk, dry materials in a pneumatic conveying system graphically illustrated by diagrams and indication lights that track process transitions from phase to phase—without human errors!

Fuller Control Panels—automatic, remote, one-man control of multiple operations—stem from Fuller's vast materials handling and instrumentation experience. Fuller, the only manufacturer of pneumatic conveying equipment engaged in engineering and building its own control panels, puts its cumulative experience into each project. This single knowledgeable responsibility for both system and control means savings in time and costs. More important—it's your assurance that the total system is generic to your specific operational needs.





Look to Fuller's engineering-manufacturing team to develop the simplest possible control system without costly duplication or changes for you. Write for Bulletin G-9, today.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
122 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

2635
CP-2

IT PAYS TO STANDARDIZE ON STANSCREW

Stanscrew fasteners add to reliability of SPEED QUEEN appliances

Speed Queen laundry appliances are built to take a beating. In these automatic washers and dryers, components are necessarily subjected to vibration, heat, moisture, and customer abuse . . . must withstand punishment year after year if Speed Queen's outstanding reputation for quality is to be upheld.

For example, consider the socket set screw being inserted on the motor pulley above. Should this loosen, the customer would have to pay for a service call . . . and Speed Queen would have to pay in consumer dissatisfaction. Therefore, to maintain rigid quality standards, Speed Queen has chosen Stanscrew fasteners for this and other demanding applications.

Despite their high standards of quality, Stanscrew fasteners are economically priced. And they are offered in a comprehensive selection of over 5,500 different types and sizes to meet the overwhelming majority of all fastener requirements. All 5,500 are quickly available through your local Stanscrew distributor.

Call your Stanscrew distributor today. He will arrange a visit from a Stanscrew fastener specialist who can often suggest ways to cut assembly or fastener costs . . . for example by substituting an inexpensive standard fastener for a costly special.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

FOUND!

A WAY TO DEGREASE MORE PARTS PER DOLLAR OF CLEANING COST

What makes the big difference in vapor-degreasing cost?

It's not what you pay for solvent. It's how long your solvent keeps working between degreaser cleanouts.

WHAT'S PSP? It means "permanent staying power." It's what you get with Nialk TRICHLOR. The stabilizer in this solvent doesn't wear out. You don't need to add fresh stabilizer when you degrease with Nialk TRICHLOR. You don't have to check the pH. The stabilizer stays with the solvent and keeps on protecting it. In the bath. In the vapor. Even after repeated distillation.

WHY IS PSP IMPORTANT? Users report substantial savings with this better, more stable trichlorethylene. Degreasers run without shutdown for weeks—even months longer between cleanouts, in many cases. Rejects are down sharply. Less solvent is needed, because less goes down the drain in unnecessary cleanouts.

To start saving in your plant—soon—see your Nialk TRICHLOR distributor. He can show you why your best buy is the solvent that doesn't wear out prematurely. Call him today.

NEW 36-PAGE BULLETIN explains fully how you get more and better vapor degreasing for the money with Nialk TRICHLOR. Shows basic types of vapor degreasers. Discusses cycles, operating procedures, stabilizers, causes of solvent contamination, solvent recovery, trouble shooting. Ask your distributor for a copy or write us.

Nialk® Trichlor, a product of

HOOKER CHEMICAL CORPORATION

310 Union Street, Niagara Falls, N. Y.

Sales Offices: Buffalo Chicago Detroit Los Angeles New York Niagara Falls Philadelphia Tacoma Worcester, Mass.
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HOOKER CHEMICALS PLASTICS

Specialties of the House

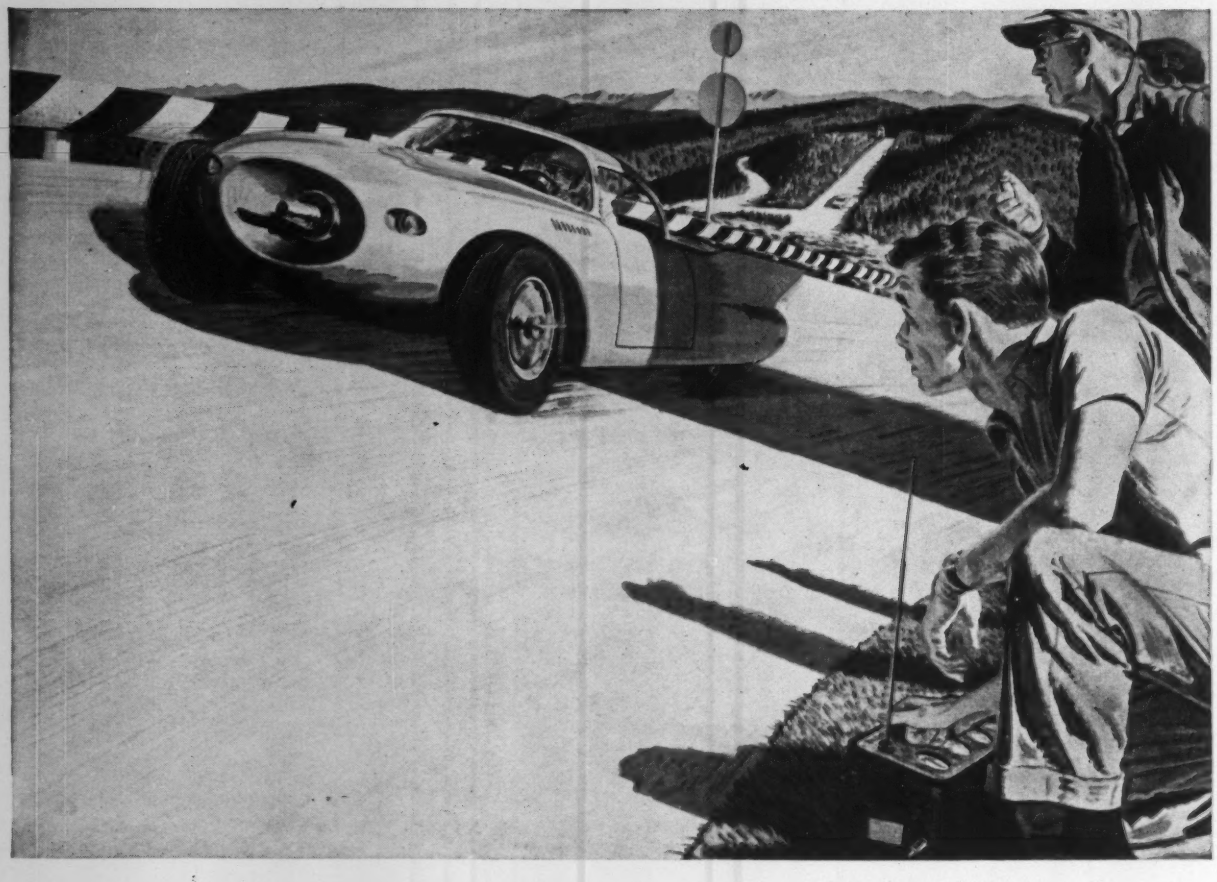
ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″... Roegal® (drawn galvanized) from .187″ to .005″.

You *pay* for the best when you buy galvanized wire. Make sure you *get* it—specify Roebling! For complete information, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it



TOMORROW'S "DREAM" IS OUR JOB TODAY

There's more to the car of tomorrow than just futuristic styling! Automotive engineers are working constantly to perfect completely new power plants—like turbine engines—to achieve yet unheard of performance and economy! And they demand bearings that are as advanced as their thinking. This is no new challenge to Bower engineers. Their many original contributions have helped increase performance and reduce bearing failure to a minimum. If your product is one which requires advanced bearings today plus realistic planning for the future, call Bower. There's a complete line of tapered, straight, or journal roller bearings for every field of transportation and industry. Bower Roller Bearing Division, Detroit 14, Michigan.

BOWER
ROLLER BEARINGS

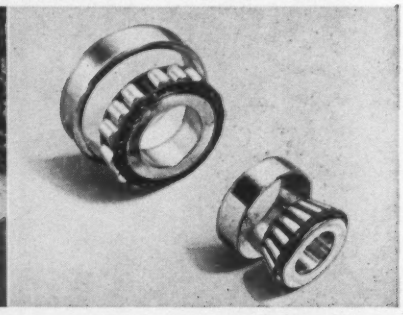
tapered
cylindrical
journal

DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.

'ROUND-THE-CLOCK DEPENDABILITY is one reason why the petroleum industry specifies Bower roller bearings.

LEADING HEAVY EQUIPMENT MANUFACTURERS use Bower roller bearings—for long, efficient life under punishing loads.

REDUCE BEARING MAINTENANCE—Use Bower tapered and cylindrical roller bearings for your application.



GENERAL ELECTRIC

now!

Tri-Clad '55' motors with THERMO-TECTOR system

WARRANTED

against burnout from overheating

For the *first time* General Electric offers you a motor with such *positive* protection it is WARRANTED in writing against overheating burnout!
G.E.'s exclusive new THERMO-TECTOR system gives Tri-Clad '55' motors truly *inherent* over-temperature protection. Unique variable shut-off feature allows motor to deliver *full power potential* under all operating conditions. Fail-safe THERMO-TECTOR system has simple, two-lead hookup.

*Trade-mark of General Electric Co.

For the first time General Electric offers you a motor with such *positive protection* it is WARRANTED against *overheating burnout*

TURN PAGE FOR FURTHER INFORMATION

NOW - A Motor *Warranted in Writing* Against Overload Burnout!

General Electric Company warrants to the Purchaser that the Tri-Clad '55' motor with Thermo-Tector system delivered hereunder will:

(a) Not burn out because of overheating resulting from overload, lack of ventilation, single-phasing, stall, high ambient, or voltage unbalance, as long as the Thermo-Tector switches are connected into the control circuit so that power to the motor is removed when an over-temperature condition occurs;

(b) Be free from defects in material, workmanship and title; and

(c) Be of the kind and quality designated or described in the contract.

The foregoing warranty is exclusive and in lieu of all other warranties whether written, oral, or implied (including any warranty of merchantability or fitness for purpose). If it appears within one year from the date of shipment by General Electric Company that the equipment delivered hereunder does not meet the warranties specified above and the Purchaser notifies the General Electric Company promptly, the General Electric Company shall thereupon correct any defect, including non-conformance with the specifications, at its option, either by repairing any defective part or parts or by making available at the General Electric Company's plant, a repaired or replacement part.

The liability of the General Electric Company to the Purchaser (except as to title) arising out of the supplying of the said equipment, or its use, whether on warranty, contract or negligence, shall not in any case exceed the cost of correcting defects in the equipment as herein provided and upon the expiration of said one year, all such liability shall terminate. The foregoing shall constitute the sole remedy of the Purchaser and the sole liability of the General Electric Company.

General Electric's *exclusive* THERMO-TECTOR system is available now on *all* Tri-Clad® '55' motors in frames 254U-445U. Contact your General Electric Apparatus Sales Office or Authorized Distributor *today* for details on this NEW FULLY WARRANTED MOTOR PROTECTION SYSTEM. Or, write for Bulletin GEA-7092, Section 866-04, Schenectady 5, N. Y.

SMALL AC MOTOR & GENERATOR DEPARTMENT

GENERAL ELECTRIC

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...

Profitability? Faced with the decision to expand your plant facilities, you should first determine whether all elements combine to form a pattern of future profitability. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. The studies and evaluations furnished by KE Pre-Engineering represent only one phase of total KE services. Kaiser Engineers designs and builds for the Steel industry...offers skilled experience in all types of facilities from raw material plants to finishing mills. From Pre-Engineering through design and construction, Kaiser Engineers provides complete one-company service and ingenuity based on years of experience.

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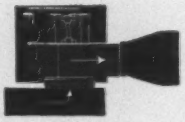
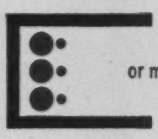
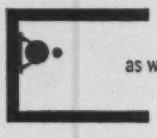
NEW DEVELOPMENT IN AIR DYNAMICS...

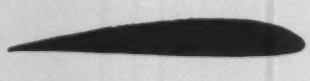
airfoil centrifugal fan performance

compactness To do a job that would take a conventional fan this big you need a CENTRILINE fan this small

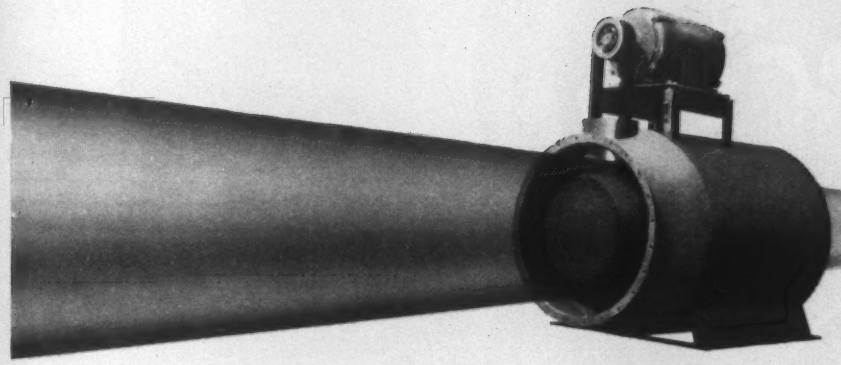
in-line air flow means additional space saving. It allows you to do this instead of this 

fan-mounted motor Makes it possible to hang CENTRILINE fans from the ceiling

or stack them  or mount them on the wall  as well as mount them on floor or platform.

quiet The CENTRILINE fan performs with the same relative quietness as conventional airfoil centrifugal fans. The secret is a Westinghouse exclusive: airfoil bladed wheels  and newly developed conversion vanes

inlet equals outlet Inlet and outlet are the same size. You can use one size of duct, making installation simpler.



NOW you can have today's airfoil centrifugal fan performance without sacrificing space.

Here are the facts in a nutshell.
We have developed a fan with **in-line** air flow, **and** the performance characteristics of the airfoil centrifugal fan.
But it is smaller by as much as 50 per cent.

And think of the added space you can save with in-line ductwork . . . saves **more** than ½ the installed space over conventional centrifugal fans.

We call our new straight-flow centrifugal fan the **CENTRILINE** ® fan.

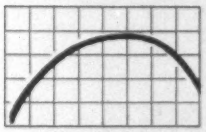
Now, from Westinghouse, you have a choice of centrifugal fan configurations—
the conventional scroll shape, or
the new **CENTRILINE** fan shape for in-line air flow.

We're ready to take your order on six sizes of **CENTRILINE** fans.
Write for the catalog.

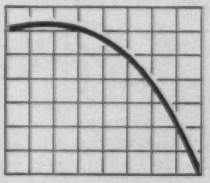
You can be sure . . . if it's Westinghouse

in half the space

® Westinghouse Trade Mark



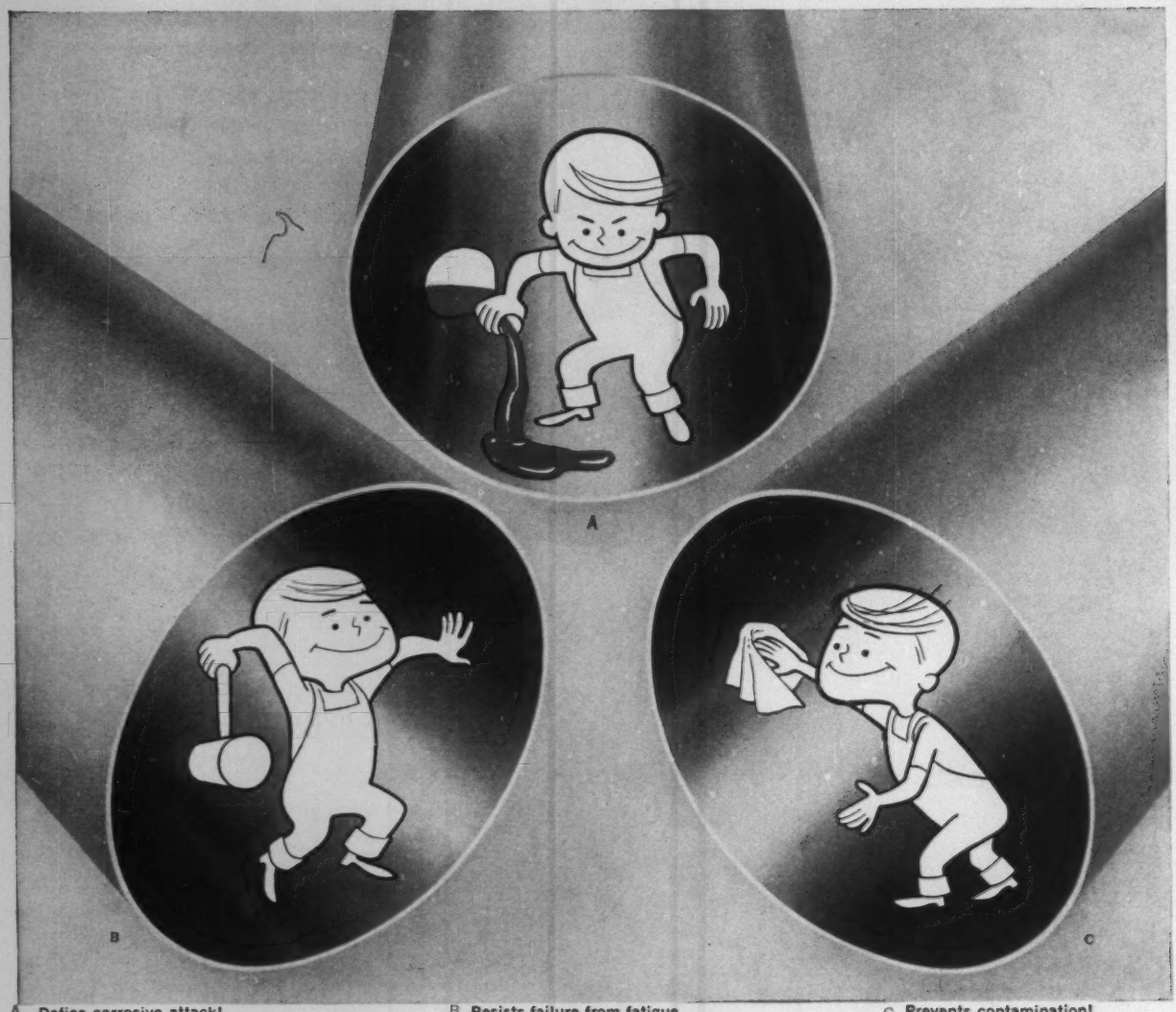
high, broad efficiency curve **Translated into money, this means lower horsepower requirements and lower operating costs over a broad selection range.**



stable pressure-volume performance **Means the kind of precise control necessary for conventional air conditioning systems as well as the high-pressure, high-velocity systems of the future . . . plus a myriad of industrial applications.**

standard specifying tables **Since the inlet and outlet dimensions of the CENTRILINE fan are closely comparable to those of a conventional centrifugal fan of the same wheel diameter, specifying the right size CENTRILINE fan and motor requires no new set of standards or computations.** Sturtevant Division, Boston 36, Mass.

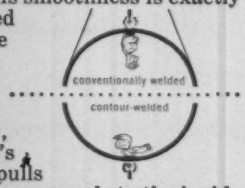
Westinghouse



A. Defies corrosive attack! B. Resists failure from fatigue C. Prevents contamination!

The "Gravity Kid" shows how
ONLY CONTOUR-WELDING COMBINES ALL THREE BENEFITS IN A SINGLE TUBE

Feel the inside surface of a Contour-welded* stainless tube. It's so smooth you barely feel the weld. Even with a microscope you see fewer crevices and flaws than you find in other makes of tubing. This smoothness is exactly the reason why Contour-welded tubing is so resistant to corrosive attack...to product incrustation ...and to failure from fatigue.



Contour-welded tubing is smoother than other tubing, welded or seamless, because it's welded at the bottom. Gravity pulls the metal down so that the weld corresponds to the inside contour of the tube. There's no bulge on the inside surface. Even on the outside surface, the seam closely conforms to the tubing shape.

Just the opposite occurs in conventionally-welded tubings. There, gravity pulls the molten metal down into the tube. This can form a bead that is difficult to remove by cold working. And cold working can lead to undercuts that become focal points for corrosive attack, incrustation, and even failure from fatigue.

Contour-welded tubing is smoother than seamless. That's because it's formed from uniformly rolled strip steel, whereas seamless must be produced by extruding or piercing.

But get the full story. Write today for our free 48-page manual, which describes tubing sizes from 1/8" to 40" O.D., in stainless and high alloy steels, titanium, zirconium, zircalloy, and Hastelloy**.

*Trent's patented process — U.S. Patent 2,716,692

**Trademark Haynes Stellite Co.

TRENTWELD® Stainless and High Alloy Tubing

Trent Tube Company, a Subsidiary of Crucible Steel Company of America, General Offices and Mills: East Troy, Wisc.; Fullerton, Calif.

"FURTHER INVENTORY LIQUIDATION" is view of the nation's purchasing men. Analysts of the National Association of Purchasing Agents say that, "a significant business upturn cannot be expected until sometime in 1961." They stress that inventory liquidations take longer than inventory accumulations.

ALUMINUM INROADS IN AUTO MARKET will mean an immediate "minimum increase" of at least 50 million lb of aluminum, according to Reynolds Metals Co. This jump is due to the aluminum engines going into 1961 models, chiefly compacts.

DELIVERED COST PICTURE CHANGES as five major shifts are ahead in shipping rates, according to Research Institute Report. Here are the five shifts: Railway express and air cargo rates will be mostly downward, truck and rail freight will continue up, and waterway rates will offer bargains.

MATERIAL HANDLING EQUIPMENT ORDERS ROSE by nearly six points in August over July in the index of the Material Handling Institute. August bookings were 131.33 (1954=100). Institute president C. L. Fell says, "The real test for sales ability of our industry should occur in the fourth quarter when capital expenditures are forecasted to decline."

LOOK TO GAS INDUSTRY FOR BIGGER MARKET for metalworking if forecasts of industry officials at American Gas Assn. convention are on target. Forecast: A jump in pipeline mileage from 629,200 in 1960 to 654,300 in 1961. Also, construction expenditures are expected to total $28 billion in the next ten years.

HOME BUILDERS LOOK FOR BREAKTHROUGH IN LOW COST MATERIALS. The really big opportunity for suppliers of home building materials lies in low-cost housing, says M. L. Bartling, Jr., president of National Association of Home Builders. He points out that while 36 pct of U. S. population is in the $4000 annual income class, they now buy only 1.4 pct of the homes.

THE PULL-OPEN ALUMINUM CAN TOP has shown considerable consumer appeal, says Aluminum Co. of America. The cans are currently being tested by Minute Maid for frozen juices. Alcoa says market tests have not been completed. However, the company has heard enough to feel it "is facing some big decisions soon."

Machine tool obsolescence is EVERYBODY'S business

These are the facts:

Machine tool obsolescence in the United States is about 50%.

Some European countries have only 10% machine tool obsolescence.

The tax laws relating to machine tool depreciation in this country are a deterrent to replacing outmoded or worn-out machines.

Every other industrialized nation offers incentives for industry to maintain and upgrade productive capacity.

Here is the result:

With better production facilities, many countries are squeezing us out of world markets; beating us in our own backyard in some instances.

Here is what has to be done:

American industry must be allowed to write off machine tools at a high-enough figure to permit replacing and upgrading *when the need arises.*

Modern depreciation allowances are now being considered that will remove these constrictions—make it easier for American industry to compete in world markets. Keep your employees informed about their stake in keeping American industry strong. More liberal depreciation allowances will mean more jobs and more job security for your employees, and ours, more business, a better chance to compete for your company and ours and greater economic progress for America.

The Timken Roller Bearing Company
Canton 6, Ohio

Vacuum Melters Push Expansion, Bank on Growing Markets

Despite market hazards and sales problems, vacuum melters have almost doubled capacity during last three years.

Still relying heavily on defense orders, they hope to develop general commercial markets.—By G. J. McManus.

▪ Vacuum melters continue to build and expand despite the prospect of changing markets and tough competition.

Over the past three years, vacuum melting capacity has nearly doubled. A new construction wave is adding an estimated 30 million lb of annual capacity. Producers are building furnaces twice the size of most now operating commercially.

In addition, vacuum degassing is being applied in new ways to new materials. Makers of large forgings have gone to stream degassing for power generator shafts. New methods of ladle degassing are being tried for carbon and specialty steels.

On the Increase—"There is no doubt but that vacuum melting will increase with the insistent requirement for better metals," says Joel Hunter, president, Crucible Steel Co. of America. Crucible recently installed a 32-in. consumable electrode furnace at Syracuse, N. Y. At Midland, Pa., the company is breaking in a degassing unit of the Dortmund Harder Huttenunion type.

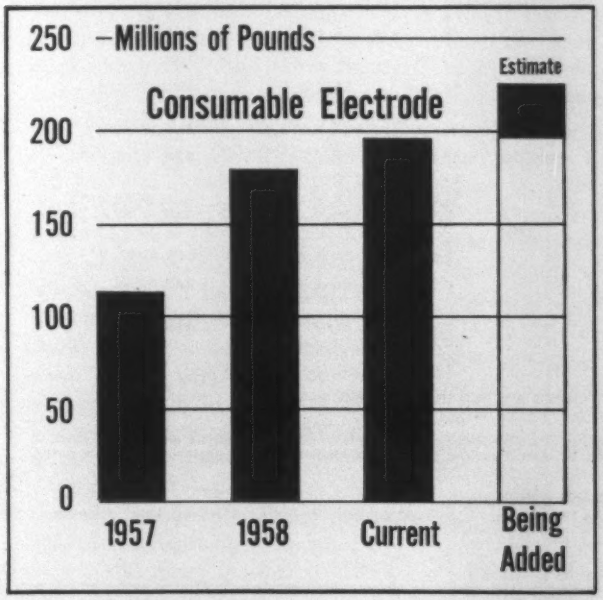
"The consumable electrode vacuum remelting process has demonstrated conclusively its ability to provide materials of the highest quality, on a consistent production basis . . ." says W. W. Dyrkacz, manager of quality, Watervliet works, Allegheny Ludlum Steel Corp.

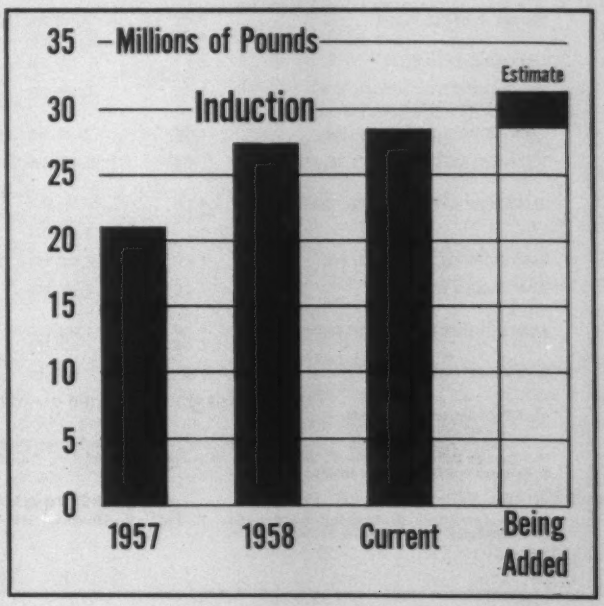
Tough Markets — All this enthusiasm and activity centers on markets that have proved chancy and demanding in the past. Iron (and nickel) base alloys account for the biggest chunk (71 pct) of vacuum melting capacity. Consumable electrode furnaces can turn out 131.1 million lbs of these metals. Induction furnaces are rated at 27.7 million lb.

In this iron base field, current demand is probably no more than half the capacity to produce. Shipments of vacuum melted steels have never gone much over the peak of 1957. Capacity has doubled since that year.

Moreover, dollar sales have dropped sharply in the last three

How Vacuum Melting Capacity Grows





Where Vacuum Melting Capacity Is Located

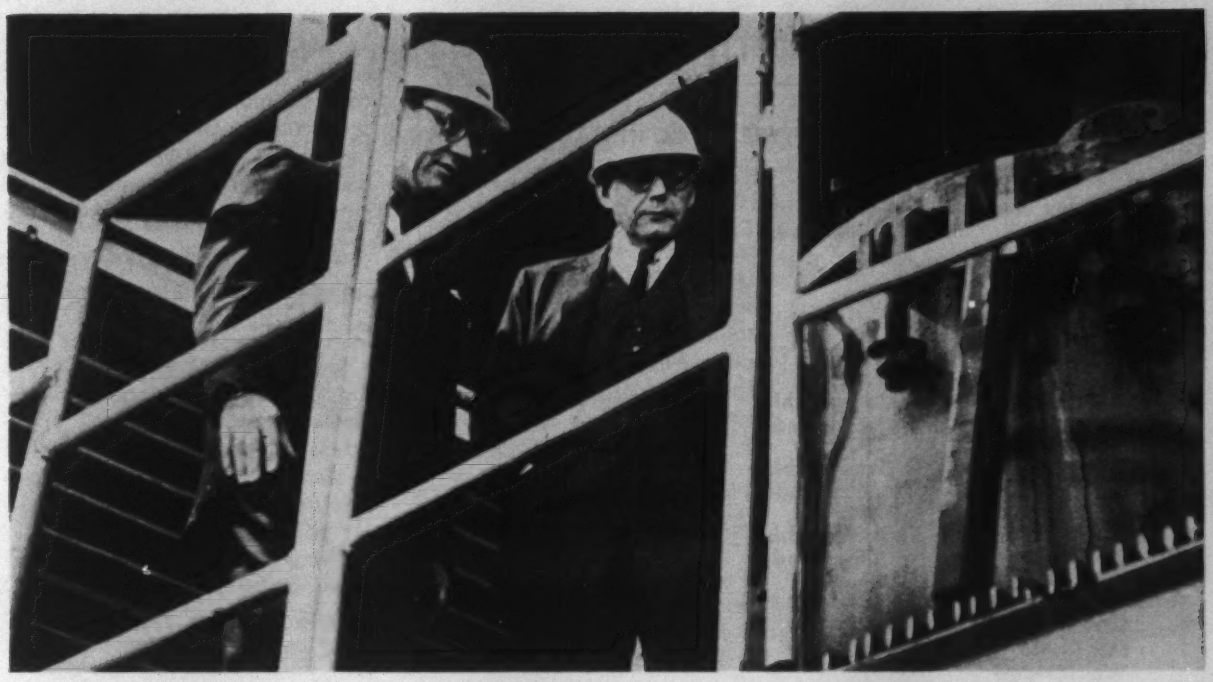
COMPANY	No. of Furnaces	Capacity (lbs/year)	Maximum Ingot Diameter Inches	Maximum Ingot Weight (lbs)	Alloys	Forms
ALLEGHENY LUDLUM STEEL CORP.*	2 CE 8 CE 1 I	900,000 Zr. 25,200,000 2,880,000	16 28 16	2,200 20,000 2,000	Zr. LA, E, T, S, HT	B&B, W, SS, P, EX, ST
ALLVAC METALS CO.*	1 I	750,000	20	3,000	LA, T, S, HT	B&B, P
THE BERYLLIUM CORP.*	3 I	120,000 Be.	25	190	Beryllium	B&B, SS, P, EX
BRUSH BERYLLIUM CO.*	4 I	360,000 Be.	9	70	Beryllium	
CANNON-MUSKEGON CORP.	1 I	400,000	8	450	LA, E, T, HT	B&B, W, SS, P
THE CARBORUNDUM METALS CO. Div. of Carborundum Co.	2 CE	1,200,000 Zr.	16	2,500	Zirconium	B&B, W, SS, P, EX
CARPENTER STEEL CO.*	2 CE 1 I	6,200,000 1,800,000	20 13	5,000 1,600	LA, E, T, S, HT	B&B, W, SS
CLIMAX MOLYBDENUM CO.*	2 CE	750,000 Mo.	13	1,500	Molybdenum	B&B, P, EX
CRUCIBLE STEEL CO. OF AMERICA	3 CE 3 I	12,800,000(1) 3,200,000	32	17,000 3,000	LA, E, T, S, HT	B&B, W, SS, P
WILBUR B. DRIVER CO.	1 I			700	E	W, Strip
FIRTH STERLING CO.(2)	3 I	8,400,000	20	8,000	LA, E, T, S, HT	B&B, W, Strip
GENERAL MOTORS CORP. Central Foundry Div.	1 I	720,000	2½	40	HT	Ingot used for casting remelt stock only.
HARVEY ALUMINUM	12 CE	3,600,000 Ti.	24	4,000	Titanium & Zirconium	B&B, Sheet
HAYNES STELLITE CO. Div. of Union Carbide Corp.	2 I	322,000	16	1,500	HT	B&B, W, SS, P
KOLCAST INDUSTRIES DIV.(3)* Thompson Ramo Wooldridge Corp.	1 I	1,440,000	15	2,400	LA, E, T, S, HT	B&B, W, Strip
LATROBE STEEL CO.*	1 CE	6,000,000	20	8,000	LA, T, S, HT	B&B
METALLURGICAL PRODUCTS DEPT. General Electric Co.	3 I	2,250,000	20 sq.	2,400	HT(4), S	B&B, W, SS, P, EX
METALS DIVISION Kelsey-Hayes Co.	7 I	9,000,000	18	5,000	LA, T, S, HT	B&B, W, SS, P, EX
MICROCAST DIVISION* Austenal Co., Div. of Howe Sound	7 I	1,000,000	15	1,200	LA, T, S, HT	B&B, Investment Castings
MIDVALE-HEPPENSTALL CO.*	2 CE	12,000,000	21½	9,300	LA, S, HT	B&B, P
NUCLEAR METALS, INC.	1 CE 4 I	10,000(5) 2,500(5)	8 5	500 250	LA, E, T, S, HT	EX
OREGON METALLURGICAL CORP.	4 CE	2,400,000 Ti. 2,640,000 Zr.	20	4,000		
REACTIVE METALS, INC.	9 CE 3 CE	12,000,000 Ti. 2,500,000 Zr.	30	15,000 Steel 10,000 Ti. 13,000 Zr.	Titanium Zirconium	B&B, W, SS, P
REPUBLIC STEEL CORP.	6 CE 4 CE	2,160,000 Ti. 36,000,000	24 32	4,000 20,000	Titanium LA, HT, S	B&B, SS B&B, SS, P
SIERRA METALS CORP.*	2 I	700,000	12	700	HT	B&B
STANDARD STEEL WORKS DIV. Baldwin-Lima-Hamilton Corp.	1 CE	8,000,000	30	30,000	LA, T, S, HT	Billets, Forgings
TIMKEN ROLLER BEARING CO.	1 CE	5,400,000	24	10,000	LA, E, T, S, HT	B&B, W, ST
TITANIUM METALS CORP. OF AMERICA	CE	22,000,000 Ti.	28	10,000	Titanium	B&B, W, SS, P, EX, ST
UNIVERSAL CYCLOPS STEEL CORP.*	2 CE 2 CE 2 I	12,000,000 2,000,000 Mo. 2,500,000	25 16 15½ sq.	13,000 5,500 2,400	LA, E, T, Mo, W, Cb, Ta. S, HT	B&B, W, SS, P, EX B&B, W, SS, P, EX
VANADIUM-ALLOYS STEEL CO.	1 CE	8,000,000	24	9,000	LA, E, T, S, HT	B&B, W, SS, P
WAH CHANG CORP.	7 CE	2,100,000	18	3,600	Reactive & Refractory(6)	B&B, SS, W
WESTINGHOUSE ELECTRIC CORP.*	2 CE 2 CE	1,000,000 500,000	18 18	3,000 2,000	E, HT	B&B, SS, P
WYMAN-GORDON CO.	1 I	300,000	12	1,000	(7)	

(UNLESS OTHERWISE INDICATED CAPACITY FIGURES ARE FOR IRON & NICKEL BASE)

CE—Consumable Electrode.
I—Induction.
*—New Facilities Planned. (1)—Does Not Include Titanium. (2)—Utilize Hopkins Process. (3)—Firth Sterling Co. is responsible for conversion and sale of product. (4)—Outside Conversion. (5)—U., Zr., Th., etc. (6)—Includes – Zirconium, Columbium, Hafnium, Tantalum, Tungsten and Molybdenum. (7)—Vacuum melt facility part of Research and Development facility.

KEY TO ALLOYS AND FORMS

LA—Low Alloy. E—Electrical and Magnetic. T—Tool. S—Stainless. HT—High Temperature. B&B—Billet and Bar. W—Wire. SS—Sheet, Strip. P—Plate. EX—Extrusions. ST—Seamless Tubing.



VACUUM MELTERS: Joel Hunter, right, president of Crucible Steel Co., and M. J. Day, vice president, commercial, look over the company's vacuum melting facilities while discussing new markets.

years. This is partly because there has been a swing from highly alloyed jet engine metals to lower alloy steels for missile applications. Equally important, production improvements and competition have brought steady price reductions.

Few Civilian Markets—For one producer, these developments have combined to drop the average selling price of vacuum melted steels from $2 a pound in 1957 to $1 a pound today. And while many commercial applications offer promise, vacuum melters still rely heavily on the defense program. According to one estimate, no more than 2 pct of today's vacuum steels go to civilian use.

A similar situation faces titanium, which accounts for 42.2 million lb (19 pct) of vacuum melting capacity. Sales have zig-zagged sideways since 1957. Prices have dropped about 50 pct since 1957. Defense applications still take most of the titanium made.

Dependence on military work leaves all vacuum melting vulnerable to overnight sales slashes. Producers still carry scars from 1957, when jet engine cutbacks knocked the bottom out of the titanium market. For some applications, missile designers are now talking temperatures that go beyond the limits of most vacuum metals.

More Capacity—With all these hazards and problems, producers are still plunging deeper into vacuum melting. In the field of steel alloys, induction melting is marking time. Output still goes mostly to jet engines and there is no great push to boost capacity.

However, there is no pause in the buildup of consumable electrode facilities. Allegheny Ludlum Steel Corp. is putting in a consumable electrode furnace that will make ingots up to 50 inches in diameter and 40,000 lb in weight.

Midvale-Heppenstall Co. rates its new remelting furnace for ingots up to 5 ft across. Crucible has its new 32-in. unit. Universal-Cyclops Steel Corp. has plans for a large furnace. Latrobe Steel Co. reports engineering work on large equipment.

Profit Potential — Behind these and other moves are two simple facts. First, producers are making money on vacuum melting. Second, they expect to make more money.

"Vacuum melting is giving profits that are of interest to a company our size," says a major specialty producer.

The melters have no assurance profits will grow and even be maintained. The Navy is now favoring fiber glass and related materials in research priorities for the Polaris program. This could prove a severe jolt to vacuum men, who look on missile cases as a prime application.

But the ups and downs of the last few years have toughened the confidence of producers. They feel it has been definitely established that melting under a vacuum produces cleaner metal. They feel it has been shown that the consumable electrode method of progressive solidification gives benefits of ingot soundness and uniformity.

Some Questions—In the melting of steels, there is some question how much controlled hardening contributes to quality and how vacuum

New Vacuum Melting Facilities

COMPANY	NO. AND TYPE	COMPLETION DATE
Allegheny Ludlum	1 Consumable Electrode	Oct. 1, 1960
Allvac Metals	1	1961
Beryllium Corp.		First Half, 1961
Brush Beryllium	1 Induction	July, 1961
Carpenter Steel	Consumable Electrode	Pending Stable Demand
Climax Molybdenum	1 Consumable Electrode	Sept., 1960
E. I. DuPont DeNemours	1 Consumable Electrode	2nd Half, 1960
Kolcast Industries Div. of Thompson Ramo Wooldridge	1 Induction	Jan. 1, 1961
	1 Induction	Late 1961 or 1962
Latrobe Steel	Consumable Electrode	Larger Furnaces Being Engineered
Microcast Div. of Howe Sound	1 Induction	Aug. 1, 1960
	3 Casting	Aug.-Oct., 1960
Midvale-Heppenstall	1 Consumable Electrode	Dec., 1960
Sierra Metals	1 Induction	Being Installed
Universal Cyclops	1 Consumable Electrode	Partially Complete
Westinghouse	Consumable Electrode	To Increase Capacity

treatment contributes. The consumable electrode method used by Firth Sterling Co. employs no vacuum at all; a slag layer covers the ingot pool. However, there is no question the arc remelting techniques generally are giving strength properties and reliability not available from conventional facilities.

Vacuum men feel there has got to be a growing market for the special qualities they offer. In the defense field, they see uncertainty and competition, but no trend away from vacuum melted steels. Steel alloys are favored in the first and second stages of Minuteman. Tonnage quantities will be needed if the Navy's current interest leads to the use of vacuum melting for submarine hull plates.

Quick Shifts—While confident of their long-term future, vacuum melters know they must be ready for quick changes in the defense picture.

One new alloy came into the picture in a big way early this year. Now it has dropped out. On another alloy, one mill is combining development, pilot production, and full production in a single run.

"If you wait until you're sure you can make a grade before taking orders. You miss good business," says a salesman.

In pricing materials, vacuum melters must live from day to day. Schedules must reflect the risk of an unpredictable market and the cost of combining development with production. A producer can't figure on getting his development costs back on future volume; defense moves can sweep aside the future overnight.

"It's not as though we were developing a substitute for 302 stainless," says a vacuum melter.

Commercial Potential—Outside the defense program, nuclear power plants are seen as a possible application for vacuum metals. The trend in atomic plants toward higher temperatures may mean vacuum melting for turbine blades.

However, the big need in vacuum melting is for general commercial markets. Actual tonnage going outside the defense program is still painfully small but progress is being made.

In developing civilian markets, price is one of the big problems for vacuum melters. Even with a 50 pct reduction over the past year, price of a low-alloy, vacuum-melted billet is 65¢ a pound. Air-melted material of the same general composition sells for 18¢ a pound.

According to one producer, the cost differential is not really as great as these figures indicate. About half the premium for vacuum melting is due to the tight specifications applied to steels made by the process.

Volume Needed—With commercial volume and commercial standards, a portion of the cost problem for vacuum melting would disappear. At least one mill has engineering plans that would put vacuum melting on a full production basis. However, there is not yet the kind of volume required for heavy production.

No technical breakthrough is seen bringing a dramatic slashing of vacuum melting costs in the near future. With experience, producers have learned to cut scrap losses and increase yields. Downtime is being reduced by new operating procedures. Larger furnaces are expected to cut costs ultimately.

Gas Appliances Gird For Battle

Market Pressures Spur Research and Promotion

A shower of new ideas and new products highlighted American Gas Association meeting.

In the works: "Invisible" flame burners, thermo-electric appliances, gas-turbine air conditioners.—By J. D. Baxter.

■ The chase is on in gas vs. electric appliances. This was the spirit and feeling of appliance makers at the American Gas Association's annual convention in Atlantic City, N. J., on October 9-12.

"The next ten years will decide which fuel will become 'the fuel of future' in home use," delegates were told by W. C. Davis, president of the Gas Appliance Manufacturers Association.

AGA president W. H. Ligon said that fuel and gas equipment sales for the ten years ending in 1969 will top $128 billion. This is 5.5 pct more than the industry's previous 100-year total. And it is nearly three times the industry's record-breaking 1950-59 total.

Research and Promotion—Other records tumble as the gas industry expands its expenditures for advertising, promotion, and research. A hefty portion of the industry's 1961 advertising expenditures of $90 million will be spent on appliance promotion. Appliances also play an important part in the association's own $2 million research program. And annual research expenditures will double this figure during the present decade.

Stiff Competition — Mr. Davis cited the case of the revived gas lamp sales as an example to show that, "no area is immune to competition." Electrical manufacturers are also pushing sales of electric lamps that simulate gas lamps.

Sprawled over 90,000 sq ft in Atlantic City's convention hall was a display of gas equipment highlighting the industry's aggressive research and marketing intentions. Here are some of the products and areas of research aimed at holding and widening the gas appliance market:

Gas burners powered by invisible flames: In this "thermocatalytic" burner, energy is produced by combustion of gas-air mixtures inside a tube or coil which completely encloses the flame. These tubes can be bent or molded to any shape and placed anywhere.

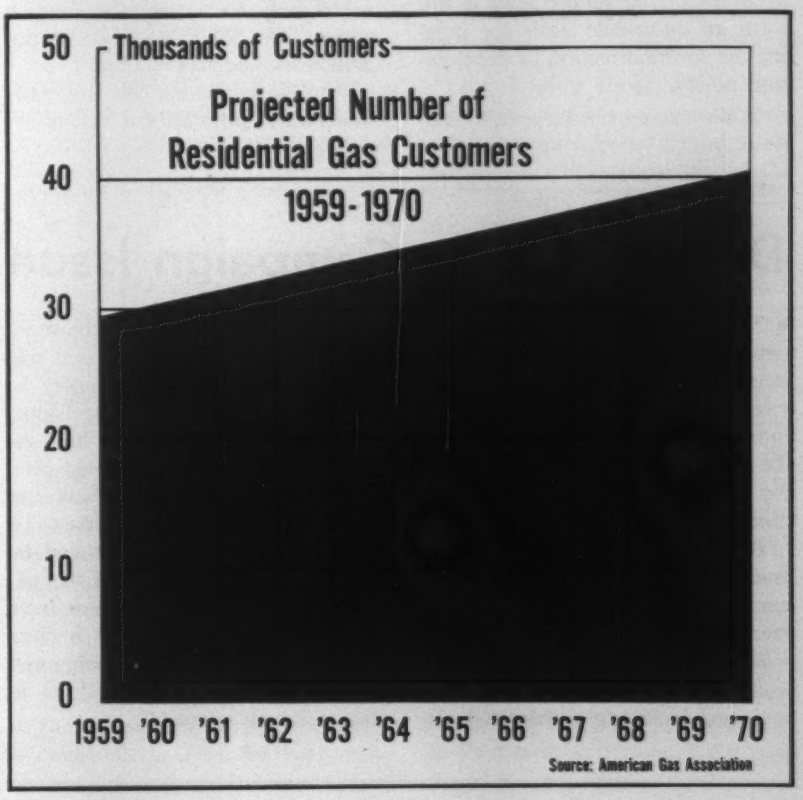
Combination range-water heater: A big space-saver, a prototype developed by AGA research was on display at the show.

A "windproof" pilot light that never fails: A large fan blowing directly on the tiny flame will not extinguish it, and it automatically relights if it ever goes out. This item was shown in a commercial food warmer.

A thermo-electric wall heater: Electricity is produced when one terminal of a thermocouple is heated by gas flame. The working model on exhibit generated its own electricity to power a circulating fan and temperature control.

A gas-turbine air conditioner: This is under study, and the association recently ordered two from Japan for research purposes.

Forecast: More Gas Users



Depreciation Survey Takes Form

Majority Surveyed by Treasury Dept. Favors Reform

Some preliminary returns of depreciation survey can now be evaluated.

Industry's replies will have a lot to do with possible tax reform.—By E. C. Beaudet.

■ The Treasury Dept. is getting close to the wire in its attempt to find out how business writes off plants and equipment on its tax returns.

Follow-up letters and, in some cases, phone calls are being used to bring in lagging responses to the Treasury's survey of depreciation practices and opinions from key companies and industries.

Base for Action—The Treasury has a lot at stake in insuring the accuracy of the survey since it will form an up-to-date basis for judging the future direction of depreciation policy.

While survey results aren't binding, they will certainly enter into the Treasury's tax recommendations to Congress next year. Congressional tax-writing committees will look into them, too.

But between then and now a staggering, computer-based tabulation job lies ahead. Started last July, the survey aims to cover two-thirds of all depreciable property in the country owned by 54 different industries in the manufacturing, nonmanufacturing and public utilities.

Who Was Asked—In the survey, Treasury has asked some 3,500 large businesses how much money they set aside for depreciation and the methods used to determine it. Also, an opinion questionnaire asked their views of revising depreciation regulations. Another 8,000 small businesses have been asked only to answer the opinion survey. The Small Business Administration made this mailing.

The big tabulation job is already underway, and after the results are analyzed the Treasury will be ready to make known the findings. Best guess for the completion of the report is next February or March.

Most for Changes—Meanwhile, preliminary reports on industry's reaction are running pretty close to form. A clear-cut majority says it is not satisfied with present depreciation allowances. Somewhat surprising, however, is the number of companies who say they are satisfied—either because depreciation is not of major importance in their field, or, it was the easiest way out.

But among the dissatisfied majority, differences begin to show up when asked to choose the method they would most like to use.

What Method—Early indications show that most companies would like to use their own judgment in setting depreciation rates, providing the method was consistently applied. This is one approach the Treasury Dept. is not very likely to buy. Too much revenue is at stake. For example, based on this year, a 10-pct hike in depreciation deductions would cut tax intake some $1.5 billion.

Seemingly, the next favored method is one which would allow business to reflect changing price levels in adjusting depreciation rates. After this, most replies asked for a selected program of accelerated depreciation for industries whose growth is deemed in the national interest.

The "bracket method" by which depreciable assets are grouped in broad classes with shorter lives shows up better against these other methods when the question asks the major reason why business feels its depreciation deductions inadequate.

Depreciation a Campaign Issue

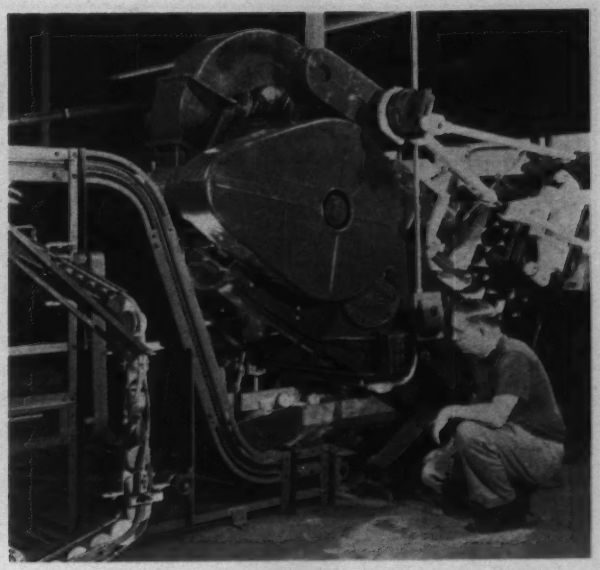
■ While rarely referred to as such, depreciation reform is a prominent issue in the 1960 election. In televised debates, major speeches, and interviews, the presidential candidates continually refer to the need for tax reform to stimulate plant modernization.

But both Vice President Nixon and Senator Kennedy differ in the emphasis on which they place comments about depreciation reform.

Says Senator Kennedy, "Whenever we can be certain that tax revision, including accelerated depreciation, will encourage the modernization of our capital plant and not be used for tax avoidance, we will proceed with such revision."

Vice President Nixon has assigned depreciation reform top priority in his economic plans, but national security needs must be met first. He says, "There can be no real tax reduction until the national and world situations have been assessed and we find it clear that all revenue needs are being met and that tax reduction will be in the national interest."

FLIP-TOP CAN?: Central States Can Corp.'s new aluminum lid system uses a tab which is pulled to remove the lower seam of the lid.



UNSCRAMBLING: A 60-ton Bliss blank - and - draw press sends cups into an unscrambler for transfer to the Bliss rotary redraw press.

Container Competition Grows

Aluminum competition picks up in the can market. Central States Can Corp. now enters the picture.

It offers a new can and top at prices competitive with tinplate. However, there are limitations. —By G. J. McManus.

■ Competition continues to increase in the battle for the can market. Latest entries were unveiled at Massillon, O., last week. They include a drawn, pre-coated aluminum can and a new pull-open can top.

Central States Can Corp., producer of both items, is now equipped to manufacture them on a commercial basis. The company says it can offer a seamless aluminum can at prices competing with tinplate. Both the can and the top are being tested for commercial applications.

J. R. McCuskey, president of Central States, says, "By using enameled aluminum coil stock and specialized manufacturing equipment, the unit cost is competitive with that of similar tinplate cans."

One Press Drawing—E. W. Bliss Co. and Kaiser Aluminum & Chemical Corp. worked with the can company in the development. Drawing equipment starts with coated aluminum stock in coil form. The coil is blanked and the blanks are drawn by one press.

The line is rated with a capacity of 200 to 240 cans per minute. The entire system is highly automated for a one-man operation. It differs from other drawing systems used for aluminum cans because there is no "ironing" of the body to final height.

Original Coating Preserved—Because of this, the original coating is preserved through forming. Elimination of subsequent coatings means significant savings. However, this same feature also imposes a limitation: can height can not exceed its diameter.

This also limits the marketability of the can somewhat. For example, it could not be used for beer, soft drinks and other deep container products. Nevertheless, it could be used for canned meats, tuna fish and such items.

Low Capital Costs — Also, the simplicity of this new process permits low capital costs. Central States mentions a $300,000 outlay for the capital program. Bliss officials indicate the new line costs far less than conventional canmaking equipment.

The new pull open top, which Kaiser has been working on for some time, resembles the top recently introduced by Aluminum Co. of America (see The IRON AGE, Sept. 8, 1960, p. 64). The chief difference in the two is the means for action. Alcoa's top is opened by pulling off a strip around the upper face of the can. Central States uses a tab around the can's side walls at the upper end.

Presently, the new cap is not designed to take the pressures needed for beer, soft drinks and processed foods. However, the company believes it will be popular for a wide range of dry products.

ECM: Mirror Image of U. S. in the "Twenties"?

Report on Europe

Second of a series of on-the-spot reports by The IRON AGE editor, G. F. Sullivan. It is written especially to bring European developments into closer focus for the metalworking executive.

■ Would recession in the United States cripple the European Common Market? How about recession in Europe—where industrial output in England, France, and the Scandanavian countries has slipped from early-in-the-year highs?

After all, the Common Market (ECM) is only a few years old—and these have been fat years. Can it stand up to lean years? Who is behind it—businessmen, bureaucrats, or idealists?

These are the sort of questions an American might ask in Europe. This report takes a hard-headed look at ECM. Why? Because if ECM really works, it is bound to affect almost every industry in the Free World.

Most European businessmen believe that the boom in Western Europe is on a sound, long-term base. They don't see it as a flash-in-the-pan easily snuffed-out by recessions. And they intend to do their utmost to make it work.

"You ask me," said Dr. Piero Giustiniani, managing director of Montecatini, big Italian mining, chemical, and aluminum combine, "if I think the Common Market will work. You are talking to an apostle of the Common Market. We will make it work because it must. And Britain will join; I don't know when or how, but Britain will join!"

Or talk to Philip Marfuggi, who directs Bundy Marine, a new company formed in Milan, Italy, by Bundy Tubing Co., Detroit, to produce outboard motors. Mr. Marfuggi is a hard-headed, hard-working American, formerly executive vice-president of Lionel Corp.:

"Look at it this way. This new common market is about where the United States was in the twenties. Suddenly you convert from six countries making most things on a small scale to a market the size of the United States. You have wages going up and working hours dropping; people have more money and more time to enjoy it. At the same time you can mass produce — which couldn't be done before.

"One big difference," Mr. Marfuggi continues, "is that this is coming faster. Take outboard motors. Sales here were 2500 in 1957. They've been doubling every year, and they hit 10,000 in the first six months of this year. Marinas are going up on the Italian lakes and seaside resorts. Look back at our development at home, starting in the 1920's; I think you'll find this is a mirror image."

There are some other similarities to the United States of 40 years ago:

(1) Everyone from clerks to top management seems to be willing to put in long, hard hours. (I called Mr. Marfuggi at 7:15 p.m.; he and most of his office staff were still working. In most of Europe you can make an office appointment for any time from 9 a.m. to 5:30 p.m.).

(2) Much of Europe's steel and automotive plant is quite new, highly efficient.

And there are places where Europeans are picking up current U. S. techniques:

(1) Several top Italian companies, including Fiat, recently set up a school of business administration in Turin; it borrows professors from U. S. business schools.

(2) They are beginning to merchandise consumer durables, and to build more supermarkets. This has cut some costs and jarred cartel-conscious managements. But there is still a lot to be done.

In some areas Europe leads the U. S. industrially. The No. 1 spot is in depreciation laws. All across the board they are more liberal than U. S. practice.

Money Isn't Everything—There's an often-overlooked reason for this urge for political and economic unity. It explains in part the gulf between the Inner Six, or Common Market, countries and the Outer Seven, or European Free Trade Assn.*

Oversimplified, it is this: The ECM nations have had two wars fought on their soil this century; all have a recent history of unstable government. By combining, they reduce the risk of war and add stability to their governments.

But it Helps—For the past six years, industrial output in the Common Market nations has been rising faster, from a lower base, than that of either the United States or Great Britain.

Today, neither Italy or Germany is talking recession. Italy's first-half industrial output was 18 pct above the year-ago figure. In Germany, the 12 months through August are 9 pct above the prior 12-month period.

Since economic health depends on political stability, businessmen want the ECM to succeed.

* Common Market countries: Belgium, France, Germany, Italy, Luxembourg and the Netherlands. European Free Trade Assn.: Austria, Denmark, Great Britain, Norway, Portugal, Sweden and Switzerland.

Lightning Strikes Powerful Blow

High-Energy Forming Methods Shape Tough Materials

Man-made lightning, dynamite, and gas are being used to make parts for missiles.

The new techniques show promise of being useful for many other jobs.—By K. W. Bennett.

PACKS PUNCH: High-energy forming machines, such as these Hermes units, make parts too difficult to be worked with conventional punch press.

■ Lightning that molds metal at pressures of seven million psi by direct static conversion is a field for metalworkers to watch.

At least 117 major U. S. firms are using man-made lightning "shots" of over 50,000 volts to handle jobs that range from cladding carbon steel with stainless steel, to cracking walnuts.

A. R. Derderian, Westinghouse Electric Corp., told tool engineers at Chicago, "There is no industry that doesn't seem to have some use for DSC" (Direct Static Conversion).

Hard at Work—Voltage is stored up in capacitors, then fired into a tank through electrodes. The extremely high voltage, vaporizing water in the tank, makes massive shock waves. These slam into a metal workpiece at a pressure of 1-3 million psi. Experimental shock waves have hit seven million psi.

At the high-energy forming seminar of ASTME, tool engineers learned: DSC is already used in forming stainless steel, titanium, copper, and the refractory metals. It can clad metals. The Russians use it for mining.

Two U. S. steel firms are studying the economics of blasting out iron ore and taconite with electrostatic discharges. The tremendous voltages will be used for mining coal, cutting stone.

Russian Progress — Electrostatic systems currently in use range from a low $700 outlay to over $35,000. The units may cover as little as 200 sq ft; can go to 3000 sq ft. They are rated on power output through their switching system, and range from 4000 volts to 50,000 volts in size. Since power output depends on the buildup of electric power in banks of capacitors, input voltage can be low.

Russian literature suggests that a DSC unit will cut stone at three times the speed of conventional means. DSC researchers guess the Russians have stolen a mild march on this one. Russian engineers are using DSC in commercial mining applications.

More important, they've broken the discharge area around a DSC unit's electrodes into zones. If you want to perforate a piece of metal you place it in "Zone A." If you want to harden it, place it in "Zone B." If you want to form it use "Zone C." There are six zones, each having some specific use in metal forming. The shock waves can even be shaped by putting a copper wire across the discharge electrodes.

High Energy Forming — Where does DSC fit in? You use it where you want production quantities, say 100 to 600 workpieces or more of a hard-to-work metal that can't be formed by other methods. Among metalworking's toughest assignments, jet-engine noise suppressors are being produced by DSC.

DSC is one phase of a growing field. High-energy forming covers explosive forming, gas-expansion forming, DSC, and recently, metal forming with a magnetic field.

Dynamite Does It—Using ordinary dynamite, General Electric Corp. forms Minuteman rocket parts up to 52-in. diameter, of steels that are classified but are "very, very tough." The company operates one of the largest explosive-forming fa-

cilities in the U. S., is reportedly using Kirksite for dies.

GE reports an unexpected boon from explosive forming. Die surface improves with wear. The blast shock waves peen the inside of the working die. Explosive forming requires very little capital outlay, is tops for low production runs of hard-to-form parts. If a long production run seems likely, then DSC may be best.

Gas-Powered Press—Another fast moving area of high energy metal forming uses expanding gas. Convair Div. of General Dynamics Corp. pioneered with its 1958 Dynapak. In January, Hermes Corp. entered the field with a gas-powered, ram extrusion press that hits the work piece at a 1000 psi speed.

In the Convair unit, the ram is powered by expanding nitrogen and generates 175,000 psi. It's been used to extrude tungsten parts, rated about the toughest. The metal billet, rammed through a closed die, squirts through like water.

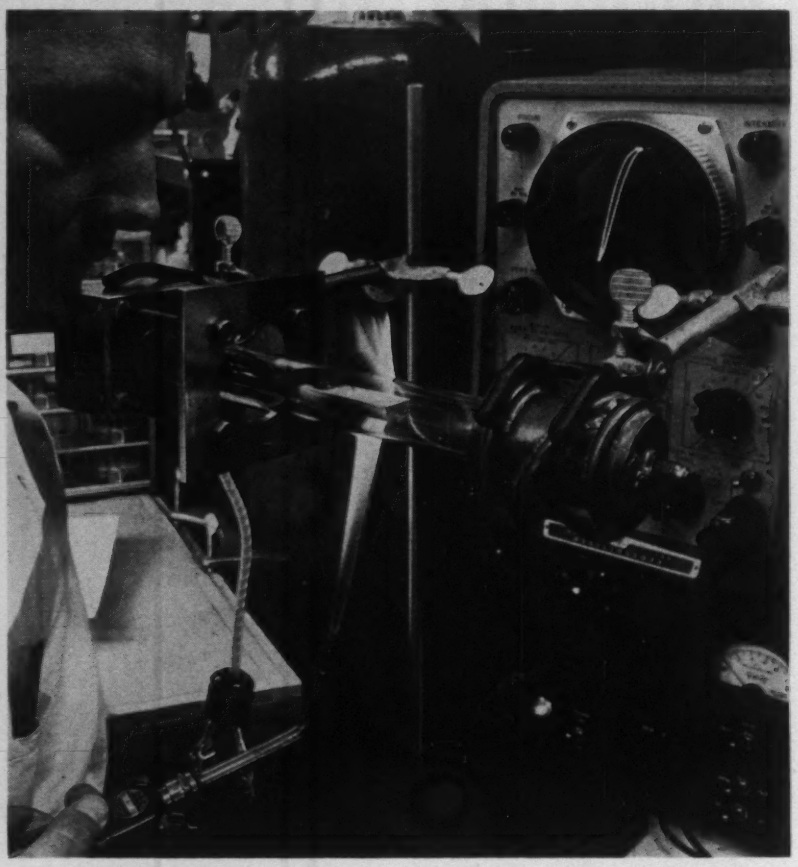
High Production—R. O. Parsons, president, Hi-Energy Forge Corp., an affiliate of Hermes Corp., indicates at least three of the firm's high-energy forming machines are sold. List prices for the Hermes range from $19,000 to a probable top of $500,000.

More important, Mr. Parsons talks of piece rates of 360 parts per hour. A nine-part die, producing nine identical high-tolerance parts, is in operation. It boosts output to 3240 parts per hour.

J. L. McDaniel, Convair Div., General Dynamics Corp., reports that its nitrogen-driven Dynapak forms titanium, columbium, tungsten, alloy and stainless steels. One part, previously machined from a 4-lb forged billet down to a 10 oz finished part, is now extruded by a Dynapak at a $6000 machining cost reduction.

New Ways — Another method: High-energy forming using magnetic fields. Using DSC circuits, experimental units have developed magnetic fields of one-half million gauss. This is equivalent to the energy developed in a dynamite explosion.

New Transistor Resists Heat



IT'S A FIRST: The first transistor capable of operating above 650°F has been developed by Westinghouse Electric Corp. The new transistor is made from silicon carbide. It's still in the testing stages.

Scrapmen Protest Proposed RR Hike

The Institute of Scrap Iron & Steel has filed a suspension notice with the Interstate Commerce Commission protesting an effort by the railroads to obtain increased freight rates.

The Institute is fighting the railroad's request calling for increases in line-haul rates, switching rates, minimum car charges, and a proposal to reduce free time at the ports from seven to five days.

The latest Institute action is in addition to a complaint filed with the ICC on Aug. 12 against alleged excessive rates for the hauling of scrap iron and steel by 49 eastern territory railroads.

Atomic Power Plant Built for CVNPA

Ground has been broken at Parr, S. C. for the Southeast's first atomic power project. Under construction is a 17,000 kw generating station for Carolinas Virginia Nuclear Power Associates, Inc.

Westinghouse Electric Corp.'s atomic power division developed and designed the proposed reactor plant. Stone & Webster Engineering Corp. is architect-engineer for the project.

The utilities will invest nearly $28 million in capital and costs of the project. The U. S. Atomic Energy Commission's cost, under its power demonstration reactor program, will be around $15 million for research, development and other charges.

He's making a Monarch Lathe...

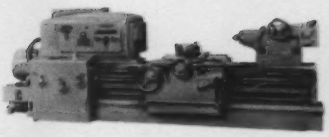
One example of where the extra values come from—in your MONARCH Lathes

This, sir, is the heart of the hydraulic circuitry in a modern Monarch headstock. This is our own *brazed* aluminum manifold and, bluntly, there's nothing else like it. Almost no piping or tubing. No varying pressures or incipient leaks. Just carefully machined flow channels in a core brazed to the two aluminum covers—for permanent undeviating responses. Courtesy of the Monarch Metallurgical Laboratory, exclusively. And component by component, assembly by assembly, you find the same story repeated throughout your Monarch Lathe.

We obviously can't hang the same price tag on this machine that you find on the lighter, stripped-down competition. So what price quality?

Assume someone in your shop picks up a "bargain" 5 H.P., 5000 lb. lathe with capacity of about 7½ cu. in. per minute. After you've discounted your bargain, how will your piece costs compete compared with a 20 H.P., 9600 lb. Monarch throwing 36 cu. in. of chips per minute? Or your down-time? Or your machine life?

Where's the "bargain?" Let us prove that it pays to buy quality. In our shop—on your job. Just write—THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO.



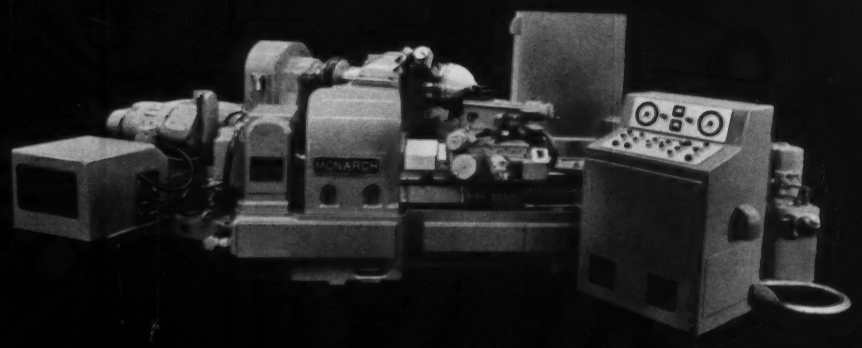
WHEN YOU BUY VALUE
MONARCHS COST LESS

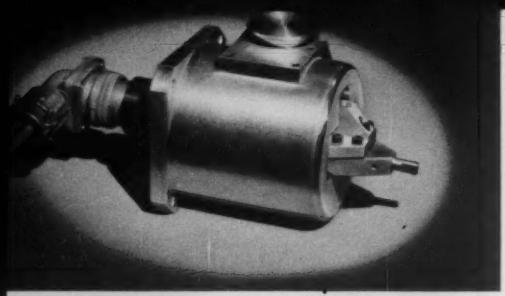
Monarch
TURNING MACHINES

VISIT MONARCH—*We'll turn your part to return you profit*

Don't Tool Up for Tomorrow's Boom with Yesterday's Lathes

MONARCH'S SPECIAL-PURPOSE LATHES OF TOMORROW...





The Series 180 tracer head—an advanced engineering jewel from the Development Laboratories of Monarch.

2..The Series 180 Ultra-Precision Contouring Lathe

Ultra-precision tolerances are brought to a new degree of perfection on this chucking type machine for contouring the O.D. and I.D. of thin-wall spherical and related shape work pieces. From the floor up the Series 180 is new in concept. For example:

1 The Monarch electro-hydraulic tracer has a stylus deflection pressure of only 1½ ounces. This, plus electrical amplification of stylus movement, instantly translates template contour change into hydraulic slide movement.

2 Tracing around a template, the contour is reproduced at the tool within a total accumulated error of ±75 millionths.

3 The constant surface cutting speed drive is separately mounted to eliminate vibration transmittal to the bed.

4 Drive is flexibly coupled to the spindle which is set at a 30° angle to the bed axis. Runout at the spindle nose is less than 20 millionths.

5 Spindle bearing lubricant is refrigerated; the floor-mounted tracer hydraulic tank is separately cooled and coolant temperature is controlled within ±.5°.

6 The machine is built and tested in a temperature controlled area and must be so operated.

The performance characteristics of the Series 180 cannot be equalled by any other lathe. Development of this machine is but another example of the many seemingly impossible turning problems solved by . . . *The Monarch Machine Tool Company*, Sidney, Ohio.

Monarch
TURNING MACHINES

IF IT CAN BE TURNED, THERE'S A MONARCH TO DO IT BETTER AND FASTER

How to Conduct a Conference

Business meetings can be useful or just a worthless waste of time.

How well they are directed has a lot to do with their success or failure.

■ When you call a business conference, you want it to be worthwhile. But to be a success, it must be properly managed. Poor handling can make it a failure.

Some suggestions on how to get the most out of business meetings are given in a new study on conference leadership by the National Industrial Conference Board. Prime purpose of today's conference is solving operating problems, the NICB says. The meeting should consist of objective unbiased discussions without emotional conflict.

What's Wanted?—The aim: Encouraging effective thinking and frank talk by all those present. If this is what the manager really wants then the conference is a good way to get it. If not, then some other type of meeting or procedure might be better.

Most important in getting results is the attitude of the leader and the mood he creates. He's expected to keep tight control of the gathering. But, at the same time, he should not dominate the discussion. Ideally, the the leader does his best not to influence people.

But control means discipline—keeping the group in order, on the subject, and moving forward.

Being Objective—How can the leader be truly neutral? He doesn't make direct statements. He puts his comments as questions, but he avoids leading questions. He uses the type of question which encourages sound thinking and free expression.

However, group action should not transfer the manager's power and authority to the group, the study points out. Instead it should aim at bringing out all aspects of a problem and weighing them before a final decision is made. The manager should still make the final decision.

Everyone Benefits—Better morale can be another worthwhile by-product of the conference. Executives who use consultation as a management technique find it benefits those taking part. Morale improves because conferees become interested and are personally involved in the decisions. The conference leader also benefits. It encourages him to depend more on group thinking and avoid unilateral decisions.

What made the conference an important problem-solving method of management? It developed with the post-war swing to decentralization and delegation. Now, executives at all levels must confer more frequently with each other for sounder decisions. Managers in decentralized situations find value in listening to subordinates as well as in talking to one another.

Some Questions for Exporters

■ If you want more sales and better profits from your export division, all sections of the company must take part.

How strong your export position is, depends on efforts by manufacturing, transportation, research, marketing, finances, and sales. A management check-list to guide you has been put out by the Bureau of Foreign Commerce, U. S. Dept. of Commerce.

If you can't answer the majority "yes," your export approach needs intense study.

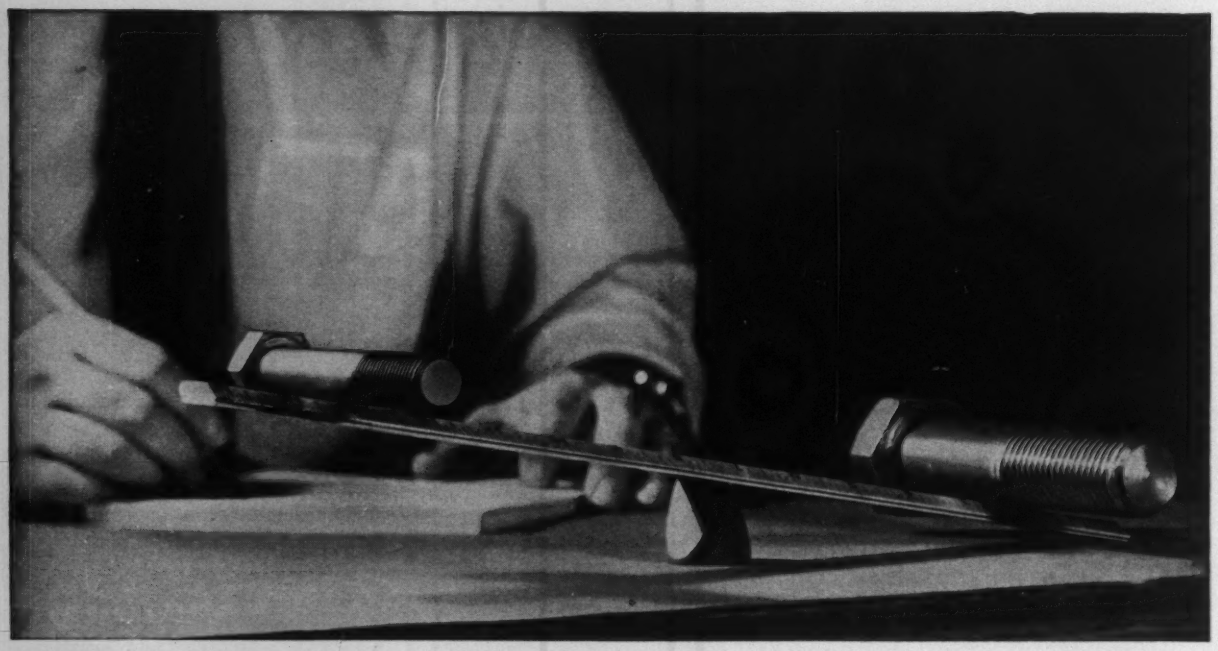
Here are the questions:

Market Research: Are means set up to keep management informed on expanding export markets? Do you keep aware of foreign competition in your domestic markets? Is market data available on possible sale of your products overseas? Do you take part in local, regional, and trade association groups studying export markets?

Sales: Has line sales management been asked to promote export sales? Is market research used to study foreign market opportunities? Have personnel been checked for their knowlege of export markets, language abilities, and worthwhile contacts overseas?

Financial: Do you have profit data on your major product lines, especially as to break-even point status? Have credit and financial sources been checked — to further help profitable export sales?

Manufacturing: Are overseas production developments studied in terms of new trends in buyer demand and acceptance? Are uses of new materials and new processing methods investigated.



Weighs a 64% cost reduction

Fastener survey by RB&W seeks to deliver maximum holding power per fastener-dollar ... makes possible substantial savings

Since the job of a standard fastener is mainly to hold an assembly together, its *"clamping force"* is what you really want. You can reduce costs by applying this fact and buying fasteners by their *holding power* rather than size.

For example, compare SAE "proof load" and cost ratios of four different hex screws of standard steels.

Grade	SAE Grade 5	SAE Grade 2	SAE Grade 2	SAE Grade 2
Size	¾ x 5"	1 x 5"	1⅛ x 5"	1¼ x 5"
Proof load (lbs)	28,400	16,950	21,350	27,100
Cost Ratio	100%	188%	239%	277%

Almost unbelievable. The smallest —the heat treated RB&W High Strength Hex Screw—exceeds all the others in load capacity, can usually be used instead of any of them. But, since it's smallest and weighs less, it also costs you less. 64% less than the 1¼" Grade 2 screw; 58% less than the 1⅛", etc. And because holes can be made smaller, you save on production, too.

Want to get the most from *your* fastener dollars? Let a specialist who best knows the subject of fasteners contribute his knowledge to that of your engineers. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

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Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.

Does Automation Hurt Labor?

Ford's M. L. Denise Says Effect Can't be Measured

Unions often blame industry automation for layoffs and unemployment. Is this true?

Ford Motor Co.'s M. L. Denise says it isn't possible to measure the effects.—By A. E. Fleming.

■ Automation has been blamed for many things by many people. It has been especially attacked by labor for adding heavily to the list of the unemployed in recent years.

Just what is automation's effect on automotive employment?

According to a Ford Motor Co. expert it can't be measured. "It's not possible," says M. L. Denise, Ford Motor Co. vice president of labor relations, "even to get a complete and meaningful count of people initially laid off as the direct result of automation."

Why isn't it possible? UAW, for example, says the impact of automation and other "cost saving equipment" is reflected in the employment and output figures of the auto industry. The union charges automation lurks behind the fact that the five major automakers in early 1960 had 136,000 fewer production workers than in the first quarter of 1955. But the number of autos built in the two periods was about the same.

Technological Changes — What's management's view on this? Mr. Denise reasons: "Changes in car making processes and technology occur side by side with changes in demand, product design and product mix with normal attrition in the work force and other factors. All of these affect employment levels and placement opportunities both company-wide and in particular plants."

FORD'S AUTOMATION: Thirty-two separate drilling and reaming operations are performed on an engine block as it passes through an automatic machine. The scene is Ford Motor Co.'s Lima, O., engine plant.

He adds: "At Ford we've found it impossible to tell what group of laid-off workers was laid-off solely because of automation." He notes that even if an accurate count of the immediately "displaced" were possible, it would have little if any significance as an indicator of automation's net effect on employment.

"The real measure," claims Mr. Denise, "would be the difference between the number actually employed at a given time and the number that would be employed at that time if no automation had occurred." But this situation isn't measurable, and the employment level can't be used as a basis for automation's effect on operations.

Following the War . . .—The Ford official goes back to the end of World War II in talking about the company's move toward more automated equipment and its effect on the workroll. Following the war, Ford executives figured the company wasn't equipped to compete efficiently in terms of costs or products when the seller's market, formed by pent up wartime demand, switched to a buyer's market.

Steps were taken to correct the situation. Ford began expanding and modernizing at a cost of over $2.5 billion for plants and facilities through 1957. Most automation equipment was installed between 1951 and 1957 with the bulk of it operating by the end of 1954.

Meanwhile production climbed. Where Ford could produce and sell just over one million units a year

in 1947-48, it could produce almost two million by 1953. Except for 1958, the two million total has been topped every year since. Ford employment also increased during the years automation equipment was installed. The company says it was able to absorb seniority employes whose jobs were affected by movements of operations and new processes, and who hadn't turned down the opportunity for other company employment.

Changes Were Necessary — "We're convinced that had we not made these improvements in efficiency, the company couldn't have prospered and grown," says Mr. Denise. "Rather than having higher employment, we would have had far less and very possibly none. It seems clear the net result of the introduction of automation and other efficiencies in our processes was to increase rather than decrease employment."

He cites transmission making as an example of how better technology boosted employment. In 1950 nearly all Ford vehicles contained manual transmissions made by the company. Some 3100 workers were needed for this. In following years, improvements in design and technology brought the more complicated automatic transmission within reach of the mass market. As a result, there are now over 9000 Ford employes turning out transmissions.

Dodge Returns To Magnesium

The diecast magnesium instrument cluster on the 1961 Dodge Lancer weighs 3¼ lb. Actually it is made up of two die castings, and marks Crysler Corp.'s return to the use of magnesium for painted parts. The cluster surrounds the instrument dials and provides mounting for the heater and automatic transmission buttons.

A Chrysler engineer says the company is considering magnesium for more parts, both decorative and functional. In the early 1950's Chrysler used magnesium for steering post housings. Magnesium is now optional in torque converter housings and transmissions housings. It is also used in convertible top mechanisms.

Chrysler To Offer After-Market Goods

Chrysler Corp.'s Cycleweld Chemical Products Div. will come out with a line of chemical car care products for the retail consumer after-market. Initial introduction will feature six products: An oil for regular engines; an oil for small engines; a gasoline additive; an all-weather windshield washer solvent; a penetrating oil; and a brake fluid.

The new chemicals will be marketed under the Chrysler name. Marketing outlets may include about 45,000 car and truck dealers, 12,000 fleet repair shops, 91,000 independent garages and 220,000 service stations. Some items also will be sold through other outlets such as hardware stores and boat dealers.

Thunderbird Has New Look and Options

For 1961, Ford Motor Co. is applying zinc-covered steel to the Thunderbird. It follows suit to the use of galvanized steel in some of last year's compacts, especially Ford's Falcon and Comet.

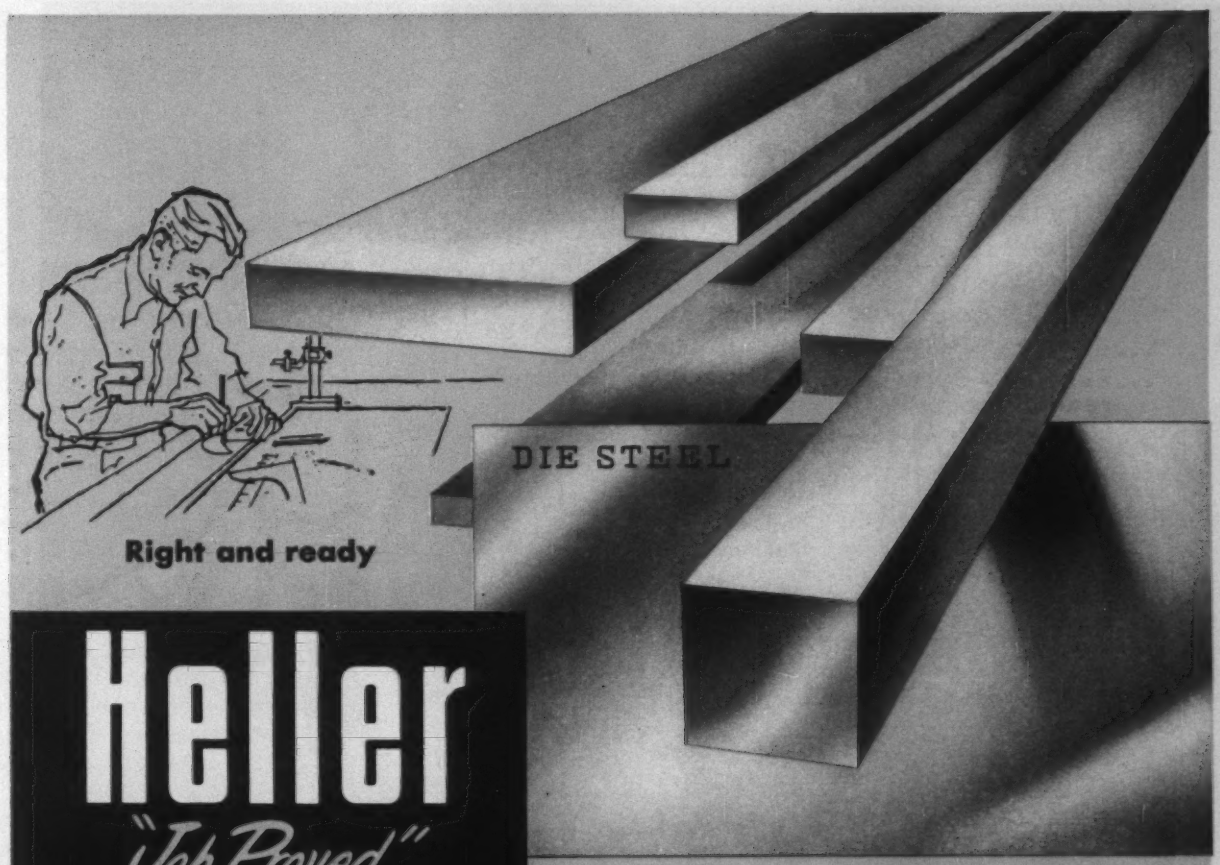
It's just one of many 1961 Thunderbird changes. Others include new styling, and a new "swinging" steering wheel.

About 35 Thunderbird body parts are made of galvanized steel this season. Major components will include all body cross members; rear engine cross member; inner, outer and lower rocker panels; rear floor side panels; front torque boxes; rocker extensions; front side rails; seat support brackets; and sheet metal around the radiator.

This should mean substantially more business for galvanized suppliers.

An exclusive engineering feature of the new Thunderbird is the optional "swinging" steering wheel. The wheel and column will swing 10 in. to one side, making it easier for the driver to get in and out of the car. The column can be moved only when the automatic transmission is in "park." The car itself cannot be moved until the steering column is in its normal position.

Although looks have changed this year, the T'Bird is the same length, width and wheelbase as last year.



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SLASHES PREPARATION TIME . . . CUTS TOOL MAKING COSTS

PRECISION GROUND FOR IMMEDIATE MACHINING. Heller die steel is spheroidize annealed for quick machining and uniform hardening . . . right and ready for immediate use. Precision ground to a smooth surface finish of less than 35 micro-inches . . . free from defects and decarburization.

COMPLETE RANGE OF SIZES — INDIVIDUALLY WRAPPED. Heller's Oil Hardening and Air Hardening types are available in over 1300 stock sizes in 18" and 36" lengths. Each unit is individually wrapped for maximum protection . . . labeled with easy-to-follow heat treating instructions.

CHOICE OF OIL HARDENING OR AIR HARDENING TYPES. Heller has a flat ground die steel for every requirement. Oil Hardening, type 01 wear-resistant alloy steel for general purposes . . . Air Hardening 5% Chrome type that provides an even higher degree of wearability. Both are recommended for dies, punches, jigs, machine parts and similar applications. Where top-flight performance is a must — Heller's Air Hardening is the answer. It reacts more favorably to heat treatment . . . assures greater margins of safety.

LOW CARBON STEEL IS AVAILABLE TOO. Where heat treating is not a necessity — Heller's fine-grained, silicon-killed, Low Carbon Steel is ideal. Extremely versatile, it is easy to machine and weld.

TAKE THE GAMBLE OUT OF BUYING! Get the double assurance of Heller Die Steel and your Heller Distributor's dependable service the next time you order. They are "sure bets" for complete satisfaction.

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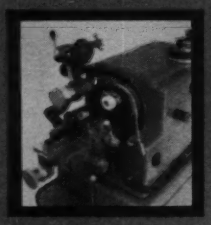
SPIROPOINT*

makes twist drills produce at Breeze Corporations, Inc.

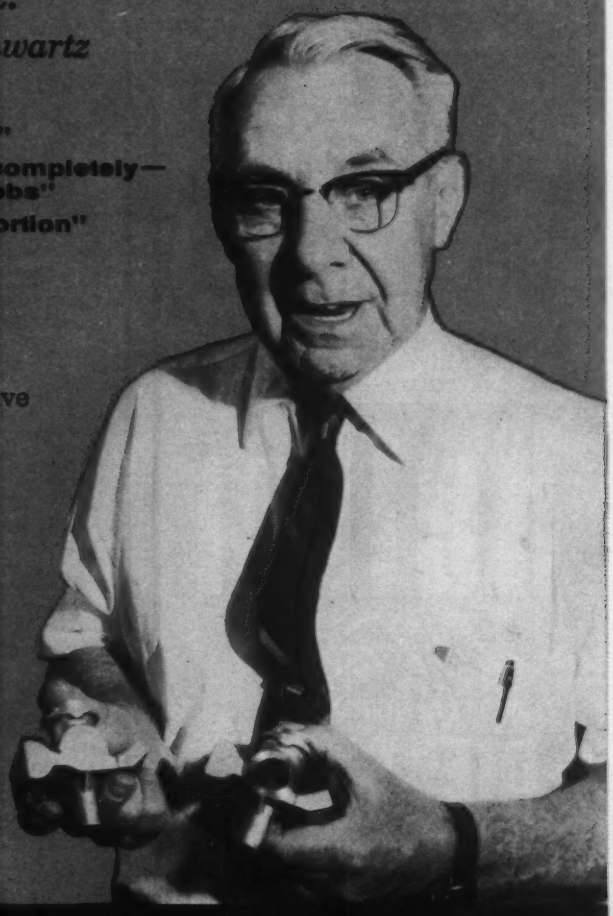
says Works Manager Harold Schwartz

"...50% greater drill life"
"...up to 40% saving in drilling time"
"...centering operations eliminated completely—reaming unnecessary on many jobs"
"...70% reduction in workpiece distortion"

Breeze Corporations, Inc. of Union, New Jersey, executes complete design and production of precision electrical, electro-mechanical, and hydro-mechanical components and systems. Drilling costs have been cut at Breeze because, with spiral points, all holes are "right on center, round, smooth, and right to size—*at both ends!*", Mr. Schwartz stated.



* Cincinnati SPIROPOINT® Drill Sharpener applies the new spiral point geometry to standard twist drills in a matter of seconds.



Works Manager Schwartz holds "Guillotine" safety device used on helicopter hoists. Production drilled holes 1½" deep are held to .001" tolerance on straightness.

Aluminum slip ring housing 3' in diameter has 576 holes. The ¾" holes are drilled through ¾" metal with spiral point drills in one-third the time normally required. Change in shape of the relatively fragile casting was negligible.

¾" drilling of this missile control launcher part is held to .001" tolerances on hole location and ⌀ diameter—center drilling and reaming operations eliminated.

CINCINNATI LATHE AND TOOL CO.
Cincinnati 9, Ohio
HYDRASHIFT Lathes • CINCINNATI Drilling Machines • SPIROPOINT Drill Sharpeners

Space Program Should Surge

Engineers Say Research Must Be Converted Into Hardware

Research and development in space projects must be converted to hardware. Then, an engineering group feels, space progress will come fast.

Welding is becoming a more important technique than ever. But problems persist.—By R. R. Kay.

■ We can have men on the moon before 1970. Our space program should be bigger and faster. Missile and rocket development will zoom at breath-taking speed.

But the big question is how to span the spectrum from research to hardware.

At least this is the opinion of many engineers attending the five-day Society of Automotive Engineers National Aeronautic Meeting and Astronautic Symposium in Los Angeles last week.

A Big Surge—They expect a surge in space progress next year because weapons systems and ground support equipment are getting out of the research and development stage and into hardware.

But there are still many problems to be overcome. For example, with the advent of missiles, space vehicles, and very high-speed aircraft, welding is becoming a more important technique than ever. There is a great need for weld-tight pressure vessels for use in solid and liquid-rocket cases and space vehicles.

Stagnant Technology—The technology of the refractory metals can't develop any further until reliable high-strength welds are made in these metals.

As speeds and heights increase, joining processes must be made to cope with problems of weight, strength and changing temperatures. Braze joining meets some of these.

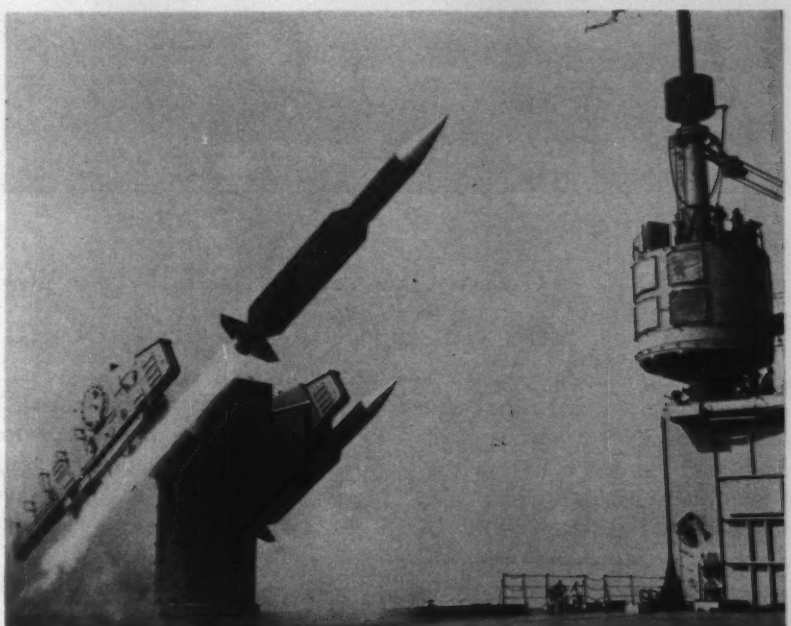
Gaining Stature—Thermal machining is gaining prominence also. This method improves the machining rates considerably. However, there is still a big need for refrigerated tools. Ultra-high-speed cutting of high-strength steel alloys is feasible. In experiments, metal removal rates are 240 times as great as conventional cutting.

However, applying it to production machining operations is a problem yet to be worked out.

Four Major Needs—Another interesting result of the symposium is that supersonic airframes will have four major needs in the near future. Corrosion-resistant steels must have precipitation hardening; there must be high-strength tool steels; nickel-base alloys; and high-strength titanium alloys.

With the big emphasis of the sessions on producing more spaceage hardware for less money, in less time, the engineers covered many areas. Among those covered were: astronautical vehicles, their propulsion, guidance, planetary and space environment; bioastronautical problems; new manufacturing processes; and ground support equipment.

Guided Missile Goes to Sea



ON THE WAY: First deck-level action photo shows the Navy's newest antiaircraft missile, Tartar, being launched from the USS Norton Sound. Supersonic missile, made by Convair Div. of General Dynamics Corp., will be primary antiaircraft weapon aboard destroyers.

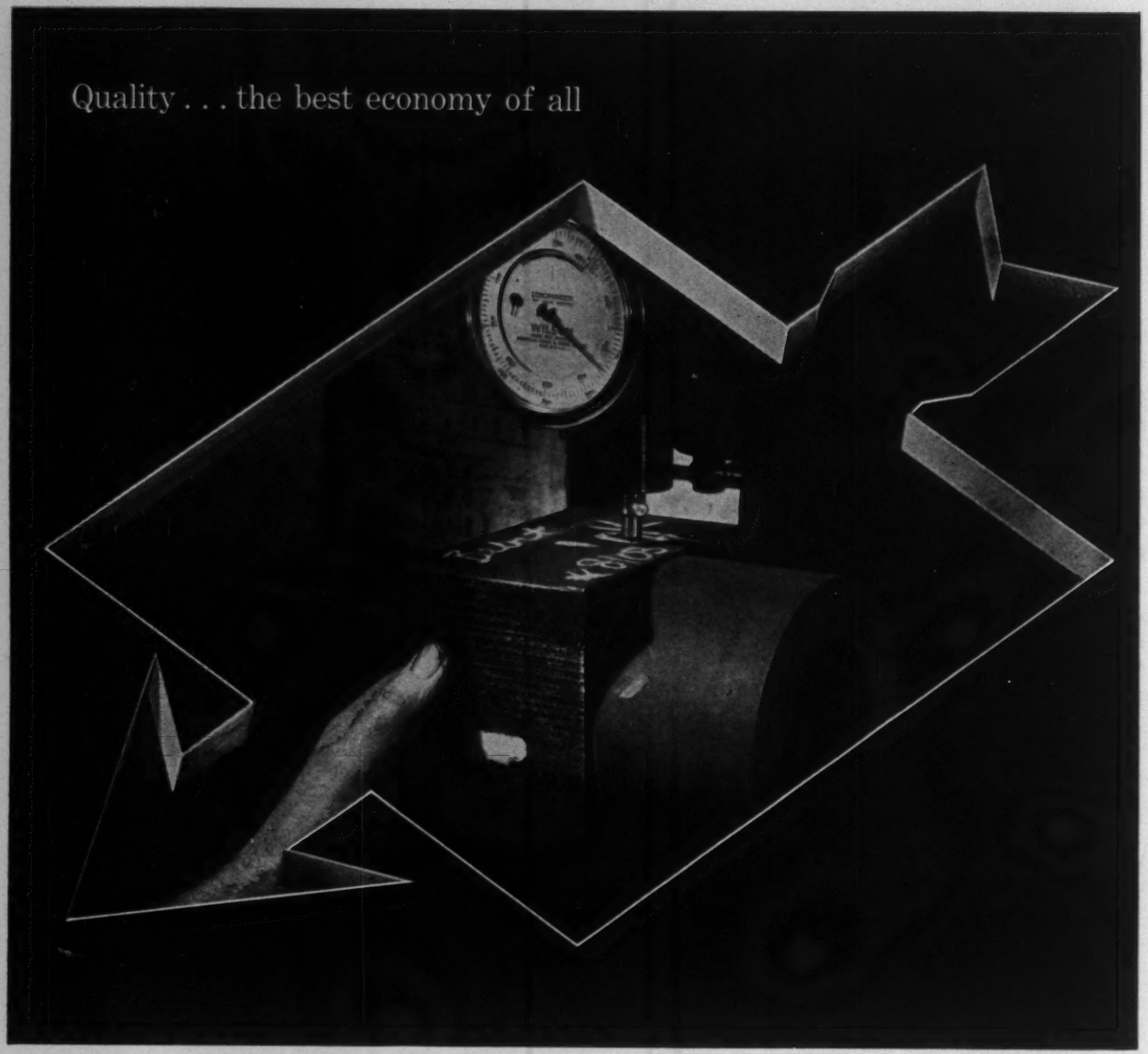


Photo courtesy of J. W. Rex Corp.

To hit the exact qualities you want . . . you need a choice of quenching oils

You can *get by* with just one quenching oil. But you can't always get the *best results* . . . not when you measure quality to a fine degree. Very often, you need a choice.

Sun makes quenching oils to reduce cooler-maintenance costs... oils with high antidecomposition qualities . . . oils for fast-quenching operations . . . oils for marquenching . . . and other "specials."

See your Sun representative for help in evaluating your quenching needs. He'll show you how to save money while maintaining quality . . . the best economy of all.

SUN OIL COMPANY, Philadelphia 3, Pa. Department IA-10. In Canada: Sun Oil Company Limited, Toronto and Montreal.

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Tax Laws Slow Modernization

Too Little, Too Late Retards Economic Growth Rate

Depreciation reform is too often thought of in terms of replacing worn-out machinery.

Some new thoughts take it further, linking it with economic growth, modernization, and productivity.—By R. H. Eshelman.

■ New thoughts on Federal tax policies governing depreciation allowances are hard to find, especially those that add to factual understanding of this difficult subject.

Here are some worthy of a close look. Not only because of the source, a top automotive executive, but for the approach linking economic growth, modernization, and productivity with depreciation.

Too often the economics of production are discussed with more heat than light. Everyone is all for greater economic growth, it seems. But few see any relationship with machine tools, or industry taxes or productivity.

Generating Jobs — In a recent speech at Syracuse, R. S. Bright, group vice president - automotive manufacturing, Chrysler Corp., noted that cooperation of many groups and agencies in that area had made it practical for the company to build a new plant to replace an outmoded one.

He pointed out that the move should generate some 1150 other jobs in the area, and over $5.5 million in annual retail sales. In this instance, both company and community worked together to stimulate economic growth.

Plant investment is made for practical reasons. Many factors are involved in creating the kind of business climate that fosters growth and prosperity.

Bureaucratic Barriers — Viewing the broader scene, Mr. Bright took aim at restrictive depreciation allowances. How is this factor keeping this country lagging behind the rest of the world in replacing worn-out or obsolete equipment?

"In drawing up and enforcing tax legislation governing depreciation, too many people in government still tend to think primarily in terms of how long it takes a machine to wear out, and not in terms of the ever-shorter length of time it takes a competitor—domestic or foreign—to make today's equipment hopelessly obsolete."

Technology Beckons—Referring to the type of equipment that will be used in the Chrysler's new plant, Mr. Bright said studies show efficiency of metal cutting tools have jumped from 23 to 46 pct in just the last 10 years.

"Every manufacturer would like to take full advantage of this kind of technical advancement," he added. "But present tax policy on depreciation allowances works against the modernizing of equipment in all business, including the automobile business."

Past or Present?—Recently another Chrysler executive, Frank V. Olds, assistant comptroller, pinpointed some specific areas needing change. Included was one calling for deductions based on today's costs —not what the original equipment cost 15 or 20 years ago under completely different conditions.

"In the long run," he told a group of accountants in Detroit, "a satisfactory solution to the depreciation problem can be obtained only by adoption of some method of price-level depreciation."

R. S. BRIGHT: Present tax policies work against economic growth.

INDUSTRIAL BRIEFS

U. S. Industries Consolidates—U. S. Industries, Inc. is consolidating its Axelson Div. of Los Angeles and St. Louis, and its Garrett Oil Tools Div. of Longview, Tex. They are USI's two major oil and gas production equipment divisions. The division, to be headquartered in Longview, will be known as the Axelson-Garrett Div. Taylor Milton, president of the Garrett Div., will become president of Axelson-Garrett.

A New Welding Dept.—D. S. Kennedy & Co. of Cohasset, Mass., has formed a Commercial Welded Products Dept. The new department will do sub-contract work in aluminum and steel weldments. It has available facilities for steel welding as well as a huge aluminum welding shop. W. R. Schneider will direct the newly-created department.

Aluminum Center Opens — On October 10, the new Delaware Valley Aluminum Center, Philadelphia, held its formal opening. Reynolds Metals Co. and its fabricator customers will supply all the aluminum products for the new center serving a three-state area. The Aluminum Center will operate as a division of Frankford Supply Co., a building materials firm.

Boosts Floor Plant—Johns-Manville Corp. opened its multi-million dollar asphalt and vinyl asbestos floor tile plant at Chillicothe, O. It is the fourth plant manufacturing resilient floorings. The new plant, strategically located to service an 11-state midwestern market, increases Johns-Manville floor tile production capacity by about 50 pct.

Armco Orders Mills — Stanat Manufacturing Co., Westbury, L. I., will supply a hot reversing mill and cold-strip mill for Armco Steel Corp. It will be installed at the Armco Research Center in Middletown, O. The order, which amounts to about $150,000 is scheduled for completion in March, 1961.

New Quarters — The Cincinnati Milling Machine Co. has taken over the adjacent real estate of the former Cincinnati Bickford Div., Giddings & Lewis Machine Tool Co. The Bickford line of drilling products has been moved to new quarters and will be manufactured in Kaukauna, Wis. New quarters are 40 miles from the Fond du Lac plant of Giddings & Lewis.

Underground Fuel For Airborne Action

NOW IN OPERATION: An underground fueling system for jet aircraft is now in operation at Lemoore Naval Air Station, Calif. It utilizes the largest diameter seamless aluminum pipe produced in the U. S. Approximately 6000 ft of 16-in. diameter pipe was supplied by Aluminum Co. of America.

Power-Fuel Contract — Harvey Aluminum Co., Torrance, Calif., and the Bonneville Power Admin. signed a 20-year contract for the supply of electrical power for an aluminum reduction plant to be built in the Northwest. The agreement provides for 75,000 kw of firm and 75,000 kw of secondary power. Site selection is to be made by July 1961, with scheduled operation of the plant in 1963.

Plant Near Completion—Cole Engineering, Inc. expects to complete its new Hayward, Calif., plant this month. The new 40,000 ft steel fabricating plant will be capable of handling weldments up to sixty tons enabling Cole to expand into heavier fabrication and field erection.

The Name's Different—Superior Steel Products Corp., Milwaukee, has changed its name to be known as Superior Die Set Corp. The new name is to identify the corporation with the manufacturing of die sets. The newly opened Superior plant at Cheshire, Conn., will be known as Superior Die Set Corp., Eastern Div.

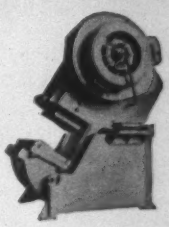
Modern Processing—Apex Smelting Co. completed a new addition to its Chicago plant. The new materials handling building will house modern and efficient aluminum scrap handling and processing equipment. It will utilize automated methods in handling raw aluminum scrap and its reduction to small, clean, clinker-like masses used in producing high-quality aluminum alloys.

A New Plant—A new plant will be built in Plymouth, Mich., by Wheel Trueing Tool Co., Detroit. To be completed and occupied by September, 1962, the plant will consolidate operations presently carried on in four Detroit locations. Wheel Trueing manufactures engineered diamond tools for industry, and diamond bits, plus saws and blades for masonry or stone cutting.

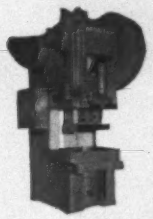
TYPES AND CAPACITIES— MINSTER® PRESSES—A COMPLETE LINE

SINGLE POINT, GAP TYPE, OPEN BACK

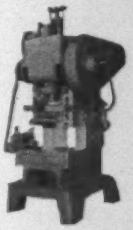
Series 1
Inclinable
6 Capacities
12 THRU 60 TONS
Bulletin Section 1



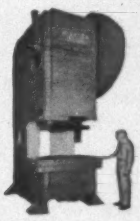
Series 1
Inclinable
Two Capacities
75 THRU 90 TONS
Bulletin Section 2



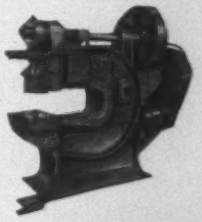
Series 70
Fixed Base
Four Capacities
45 THRU 90 TONS
Bulletin Section 3



Series B1
Fixed Base, Automatic
Five Capacities
16 THRU 60 TONS
Gap Press Bulletin

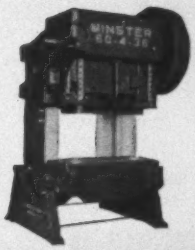


Series G1
Fixed Base or Inclinable
Four Capacities
75 THRU 250 TONS
Bulletin Series G1

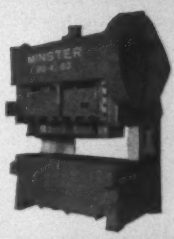


Series 20
Deep Throat Type
Three Capacities
15 THRU 35 TONS
Gap Press Bulletin

TWO POINT, GAP TYPE, OPEN BACK

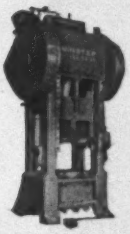


Series 60
Inclinable—Five Capacities
22 THRU 75 TONS
6 Widths Ea. Cap.
Request Specifications

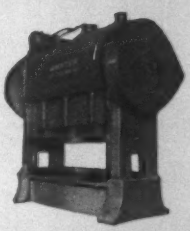


Series 80
Fixed Base—
Five Capacities
22 THRU 75 TONS
6 Widths Ea. Cap.
Request Specifications

STRAIGHT SIDE PRESSES

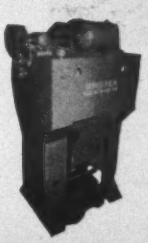


Series S1
Twelve Capacities
50 THRU 600 TONS
Bulletin Series S1

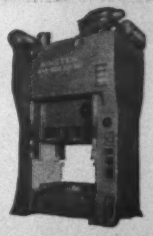


Series S2
Ten Capacities
50 THRU 400 TONS
Five Widths Ea. Cap.
Bulletin Series S2

STRAIGHT SIDE PRESSES — M SERIES

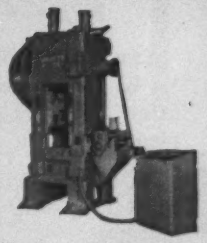


Series MS1
Three Capacities
300 THRU 500 TONS
Request Specifications

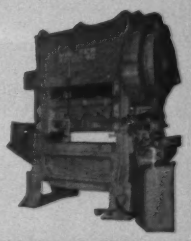


Series MS2
Five Capacities
150 THRU 500 TONS
Five Widths Ea. Cap.
Bulletin Series MS2

PIECE-MAKER AUTOMATIC PRODUCTION PRESSES

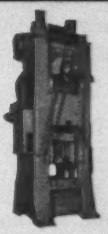


Series P1
Three Capacities
75 THRU 150 TONS
Bulletin Series P1



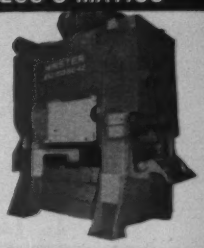
Series P2
Nine Capacities
20 THRU 300 TONS
Four Widths Ea. Cap.
Bulletin Series P2

KNUCKLE JOINT PRESSES



Series 90
Six Capacities
150 THRU 1000 TONS
Bulletin Series 90

PROGRESS-O-MATICS

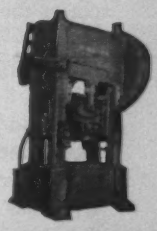


Series PMS2
Five Capacities
150 THRU 500 TONS
Five Widths Ea. Cap.
Request Specifications

HORNING PRESSES

Series 10
Eight Capacities
16 THRU 90 TONS
Bulletin Series 10

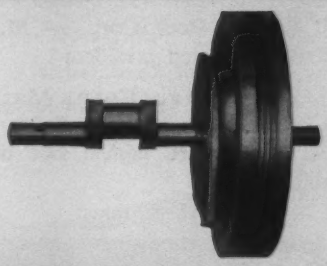
HEAVY DUTY BLANKER



40E-9
400 TON
Bulletin 40E-9

CLUTCH CONVERSIONS

Minster patented Combination Air Friction Clutch and Brake unit for clutch conversions increases production, reduces maintenance.
Bulletin CC57



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Gentlemen: Please send me a copy of Bulletin_____

Name_____ Title_____

Company_____

Address_____

City_____

Nature of Product_____

MEN IN METALWORKING

E. L. Ladd, named president, Brooks & Perkins, Inc., succeeding E. H. Perkins, who remains as chairman of the board.

Pittsburgh Plate Glass Co. International, S. A.—**F. W. Theis,** elected president and chief executive officer and **Bjorn Holmstrom,** as chairman of the board of directors. Mr. Theis succeeds **D. R. Means,** who is retiring but will continue to serve as a consultant.

Capitol Steel Corp. — **M. L. Zwerin,** elected president.

Borg-Warner Corp., Marbon Chemical Div.—**W. A. Suiter** and **R. M. Stewart,** named vice presidents.

Lycoming Div., Avco Corp.—**W. G. Dollmeyer,** named vice president, operations, Stratford, Conn., plant.

Reynolds Aluminum Service Corp.—**S. W. Jagger,** named vice president.

Acoustica Associates, Inc.—**K. F. Vogt,** appointed vice president, marketing.

Veeder-Root Inc.—**D. R. Piatt,** appointed vice president, engineering and research.

Litton Systems, Inc.—**W. J. Jacobi,** appointed as vice president of the company and general manager, Guidance and Control Systems Div.

Ducommun Metals & Supply Co. —**Wayne Rising** and **R. C. Simpson,** named senior vice presidents.

Taylor Fibre Co.—**H. L. Hildebrand,** named manager, process and design engineering and **J. G. Musselman, Jr.,** appointed manager, Fabricating Div.

The Eimco Corp., Tractor-Loader Div.—**L. H. Bates,** appointed plant manager.

Duff-Norton Co.'s Jack Div. and Coffing Hoist Div.—**D. A. Anderson,** appointed New York district sales manager.

G. B. McMeans, appointed vice president, Kaiser Industries Corp. and Henry J. Kaiser Co.

Lindberg Engineering Co.—**J. E. Krickl,** appointed Western district sales manager.

Metal Buildings Div., Inland Steel Products Co.—**L. S. Shealy,** appointed Central regional sales manager, Milwaukee headquarters; **Maurice Schulzinger,** appointed Eastern regional sales manager, Cincinnati headquarters; **J. A. Wurman,** appointed Southern regional sales manager.

National Steel Corp.—**F. B. Hutton,** appointed district sales manager, Cleveland office; **A. W. Pettit,** named general manager, sales, Weirton Steel Co., and **O. V. Johnston,** named general manager, sales, Mid-

(Continued on P. 140)

Oscar Ahlers, named vice president and general manager, The Sheffield Corp., Dayton, O.

Roy Heldenbrand, appointed vice president, operations, The Sheffield Corp., Dayton, O.

Dr. C. W. Phillips, named manager, Research Services Dept., Ford Motor Co.'s Scientific Laboratory.

Ohio Rolls

SHAPING METAL FOR ALL INDUSTRY

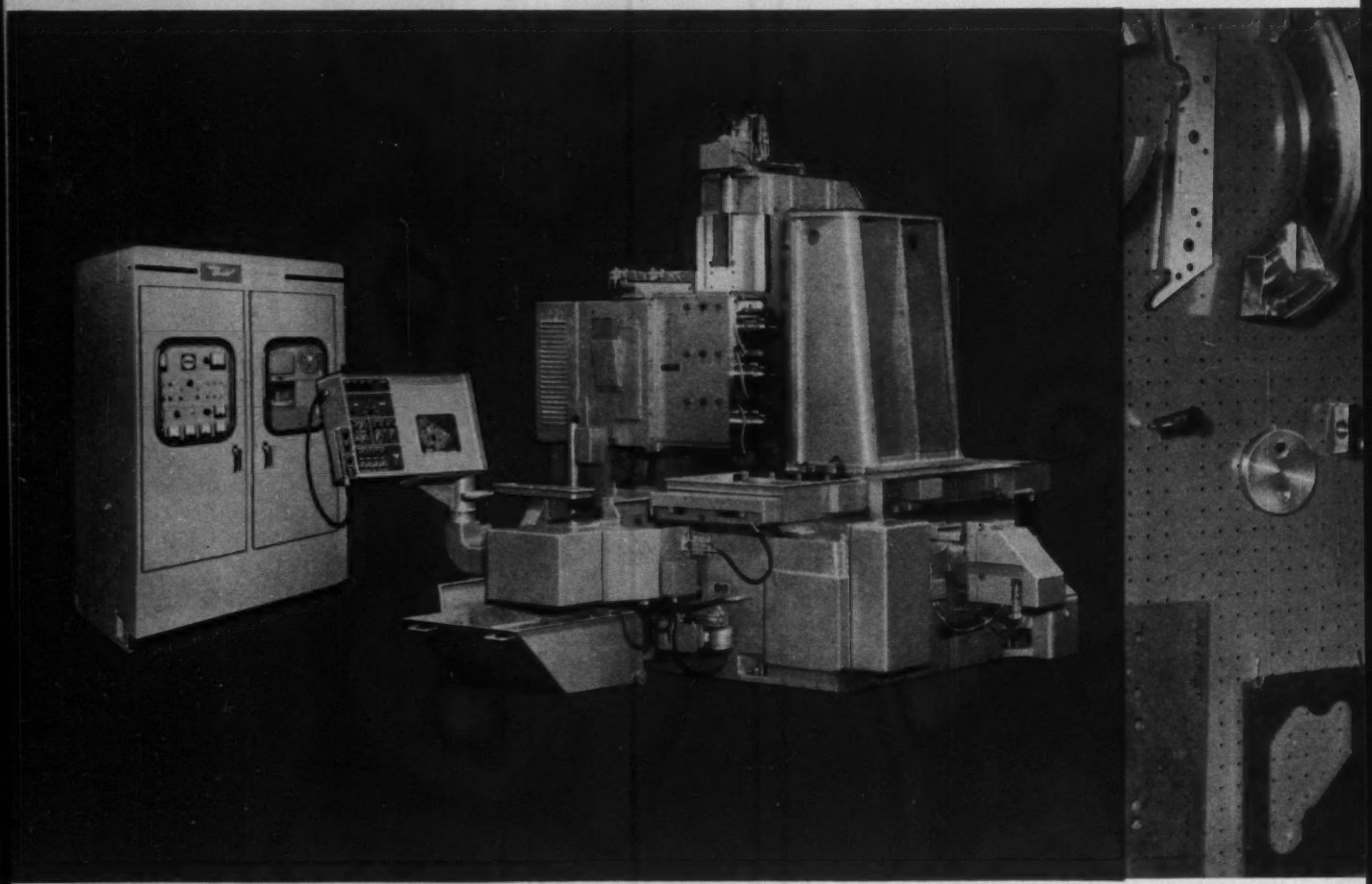
Ohio Iron and Steel Rolls

- FORGED AND HARDENED STEEL ROLLS
- Carbon Steel Rolls
- Ohioloy Rolls
- Ohioloy "K" Rolls
- Flintuff Rolls
- Double-Pour Rolls
- Chilled Iron Rolls
- Denso Iron Rolls
- Nickel Grain Rolls
- Special Iron Rolls
- Nioloy Rolls

THE OHIO STEEL FOUNDRY CO., LIMA, OHIO

PLANTS AT LIMA AND SPRINGFIELD, OHIO... *Virtually at the center of the steel industry*

NOW—BENDIX OFFERS COMPLETE LINE

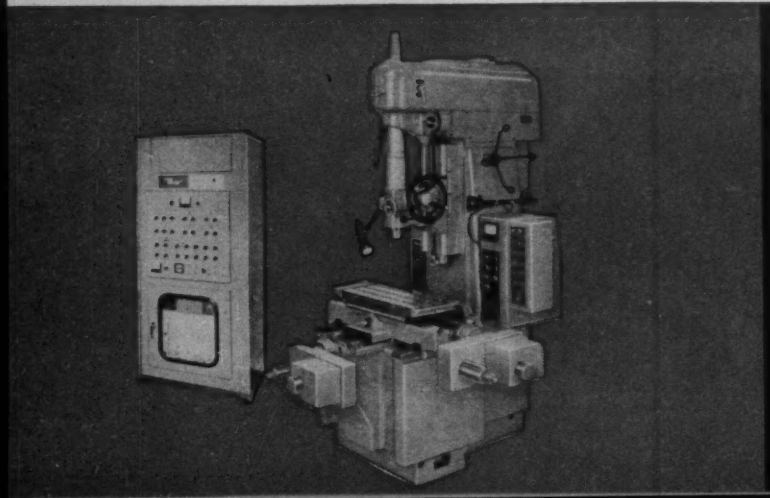


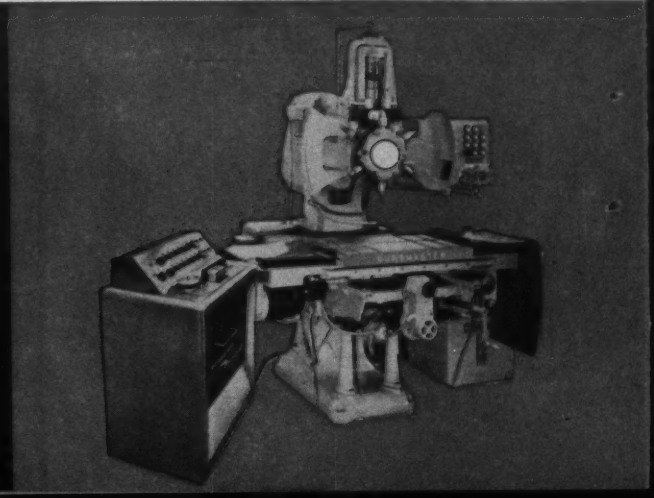
DYNAPATH-23 NUMERICAL CONTOURING CONTROL. Featuring *Circular Interpolation* to permit the close-tolerance machining of arcs and circles, as well as straight lines, with a minimum of input data. Offers 0.0002-inch resolution on 2, 3, or more axes of control. Each application individually engineered for the best possible combination of machine tool and control unit.

TREMENDOUS VARIETY of parts machined with Bendix numerical control shown here. Parts range from complex missile components to simple but extremely accurate cams.

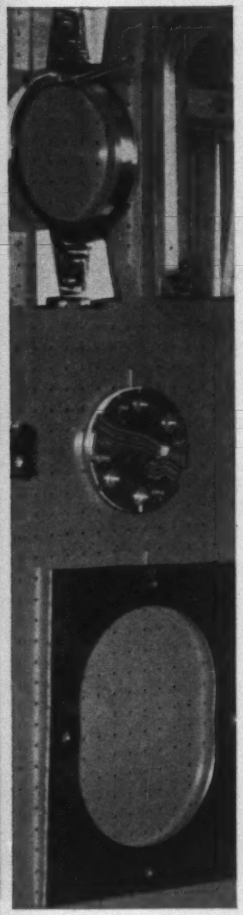
DYNAPOINT-22 NUMERICAL POSITIONING CONTROL. Provides the finest electronic resolution available anywhere—0.000010″ for jig borer accuracies within 0.0001″ on finished parts. Uses 8-channel binary-coded decimal tape format—compatible with other N. C. units and with standard tape preparation equipment.

FERRANTI FP-22 NUMERICAL POSITIONING CONTROL SYSTEM. Floating zero for fast, easy set-up and low-cost tooling. Dial input provides manual operation flexibility. Wear and loss of accuracy eliminated because there are no contacting parts in measuring units.





OF NUMERICAL CONTROLS



New, completely transistorized POSITIONING and CONTOURING units provide greater reliability, lower operating costs and made-to-order accuracy.

Tested and proven in scores of installations, over thousands of productive hours, Bendix numerically controlled contouring systems have become recognized as the finest. Based on this solid history of achievement, The Bendix Corporation now introduces its second generation control systems, the DynaPath-20 Series Numerical Contouring Controls, and the Dyna-Point-20 Series Numerical Positioning Controls.

To further extend its broad coverage of the numerical control field, Bendix has obtained exclusive rights to distribute the Ferranti tape controlled positioning units and Ferranti's unique coordinate measuring machine.

Bendix backs up the most complete line of numerical control equipment with the best and most complete service organization in this country. From application engineering through tape preparation, customer training and field service, Bendix has had more teamwork experience than has any other electronic controls manufacturer in the field.

Only at Bendix can the machine tool builder and user find everything he needs for numerically controlled manufacturing. Why not investigate Bendix PACKAGED PRODUCTIVITY today.

FERRANTI FI-22 COORDINATE MEASURING MACHINE. Checks workpieces up to ten times faster than conventional methods. Direct and continuous readout (in ¼-inch figures) of hole center locations with one-set-up simplicity. Accuracy of ±0.001" over entire 15" x 24" range.

THE Bendix CORPORATION

Industrial Controls Section

21820 Wyoming, Detroit 37, Michigan

For additional information on Bendix Numerical Control and Measuring Equipment, please write to Bendix at the above address.

For Quality and Economy Use

MALLEABLE

For Service Contact...

CONNECTICUT
Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

(Continued from P. 136)

west Steel Corp., both divisions of National Steel.

The Wayne Pump Co., Industrial Div.—**J. D. Fansler,** appointed manager, rotary and industrial pump sales, Fort Wayne, Ind.

J. D. Adlam, appointed manager, systems and procedures, Wheeling Steel Corp.

A. M. Byers Co.—**R. D. James,** appointed manager, Southwestern Div., Houston headquarters.

The Goss Co., Div. of Miehle-Goss-Dexter, Inc.—**Frank Chudoba,** appointed machine tool coordinator.

Vanadium Corp. of America—**J. H. McGraw,** appointed Eastern district manager; **D. A. Hackett,** appointed asst. district manager, Detroit; **G. H. Abel,** appointed district representative, Eastern district.

W. J. Nock, appointed vice president, Mexican Div., American Smelting & Refining Co.

E. P. Sandbach, appointed manager, manufacturing, Macintosh-Hemphill Div., E. W. Bliss Co.

Allis-Chalmers Mfg. Co.—**E. F. Greiwe,** named manager, new Pump and Compressor Dept.; **R. J. Dineen,** named manager, Norwood, O., Works, Centrifugal Pump Dept.; **C. F. Codrington,** appointed manager, sales, and **H. L. Ross,** as manager, engineering, Pump and Compressor Dept.

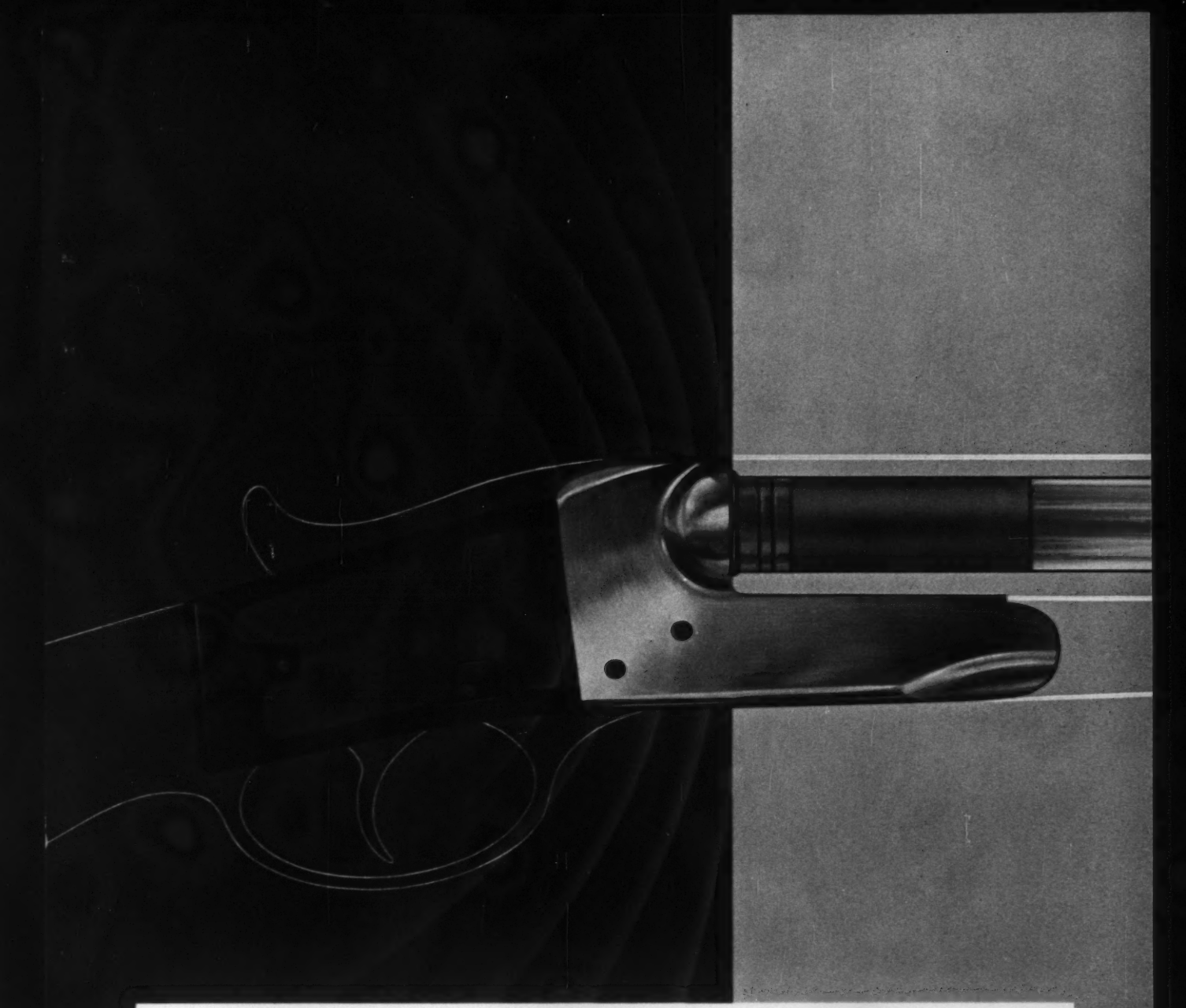
Koppers Co., Inc.—**A. E. Jones,** appointed asst. director, procurement.

A. E. Von Alt, named superintendent, Blast Furnace Dept., Chicago district steel plant, Republic Steel Corp.

Crucible Steel Co. of America—**M. N. Lindsay,** has been made responsible for the sales of coke and pig iron.

The Electric Autolite Co., Re-

(Continued on P. 143)



Pressure on the face of this Malleable iron receiver approaches 5 tons per square inch each time this 12 gauge shotgun is fired.

For Really Tough Parts...Use Malleable

With high powered charges being fired just inches from your face, you don't want parts that can't take it. That's why so many weapon parts are made of tough Malleable iron castings.

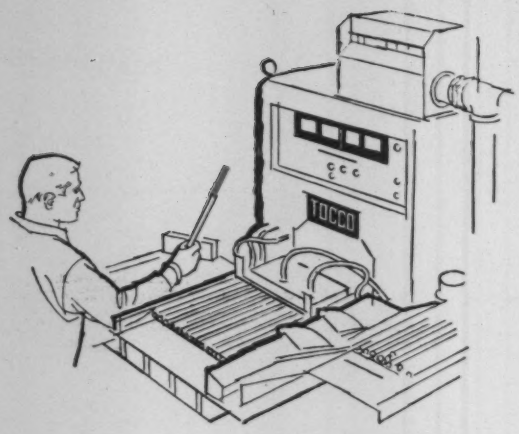
Tremendous resistance to impact, fatigue, deflection, and wear also makes Malleable castings favorites among manufacturers of mining and construction equipment, heavy-duty tools, and other products that require extra tough components.

Have you investigated how Malleable castings will improve your product's performance and cut costs at the same time? If not, send drawings or outline of your requirements to a nearby Malleable castings producer who displays this symbol —

MEMBER

MALLEABLE CASTINGS COUNCIL

For detailed information on "Toughness", contact any of the progressive companies listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.



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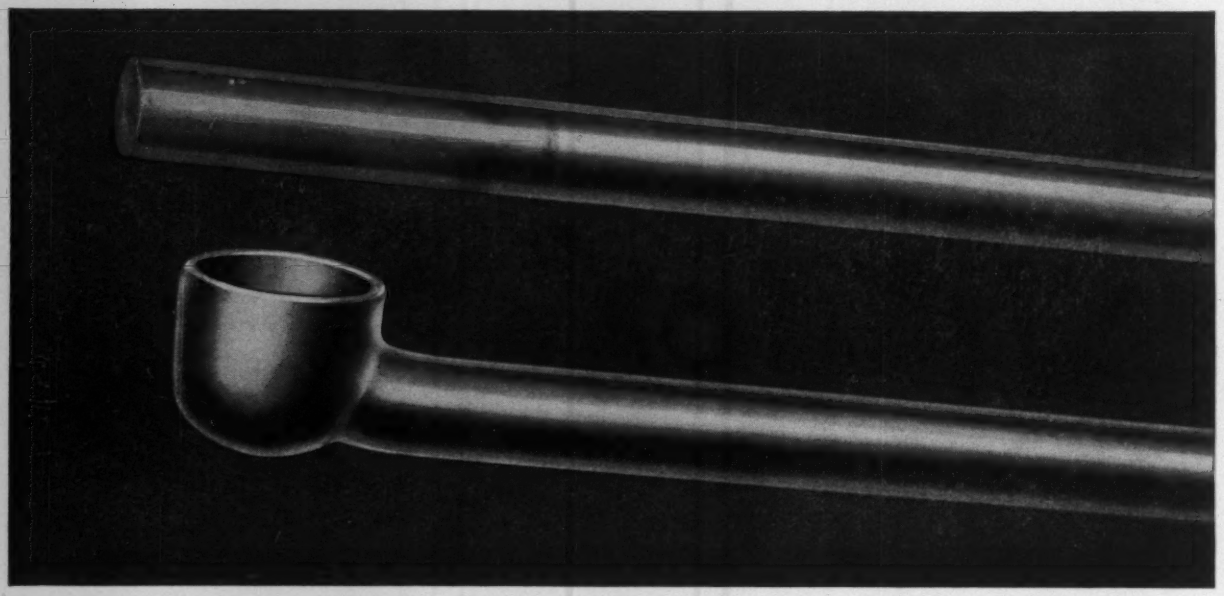
with TOCCO* *Induction Heating*



Engineers at Thompson Products Michigan Division of Thompson RamoWooldridge, Inc. recently changed from gas-fired furnaces to fully automatic TOCCO. Application: heating for forging of automotive tie rods. Result: a substantial reduction in direct labor costs, saving thousands of dollars a year on this heating for forging operation. *Annual savings actually amortize the cost of the TOCCO installation in about one year.*

The automotive tie rod shown here is only one of over 500 parts heated for forging in Thompson's new, modern forge plant. *Every one of these parts is heated with TOCCO equipment.*

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Name_____

Position_____

Company_____

Address_____

City_____ **Zone**____ **State**_____

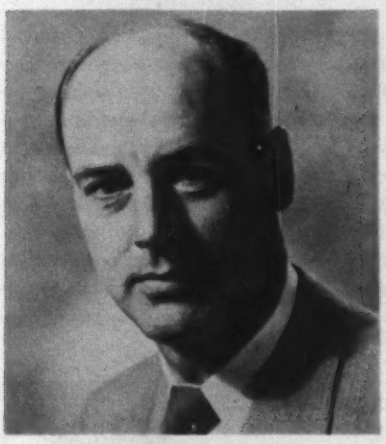
(Continued from P. 140)
placement Sales Div.—**A. A. Feldman,** named staff assistant to the director of replacement sales; **R. A. Vinciguerra,** appointed manager, national account sales.

R. S. Reichmann, appointed manager, industrial relations, Atlas Steels Ltd., Welland, Ontario.

Clearing Div., U. S. Industries, Inc.—**A. L. Barbaro,** appointed director, purchases.

Seaporcel Metals, Inc. — **Fred Burmeister,** appointed sales manager, Washington, D. C., office.

Superior Foundry, Inc.—**Donald Fosnaugh,** appointed controller.



R. E. Woodcock, named manager, Fort Wayne Div., Dana Corp.

Bliss & Laughlin, Inc.—**Robert Nicolls,** appointed sales representative, Chicago and suburban area.

The International General Electric Co. Div of General Electric

(Continued on P. 146)

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"Job-Mated" cranes by Shepard Niles fit the job picture perfectly because each one is built to meet exact on-the-job conditions. The ideal combination of capacity, clearance, speed and controls is specified to assure years of highly efficient, economical service, and to keep wear and maintenance to a minimum.

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For further information on Shepard Niles cranes, and how they can improve your plant operation, write for a descriptive bulletin, and ask to have a Shepard Niles representative call at your convenience.

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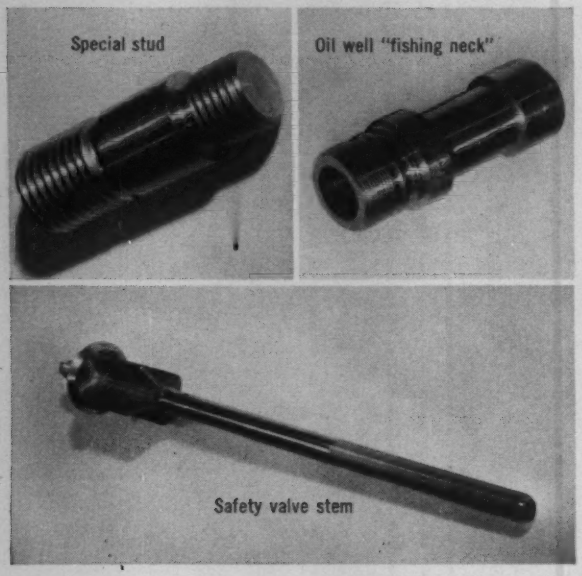
ARMCO STEELS for better products – lower costs

HOW ARMCO 17-4 PH SOLVE THESE DESIGN AND

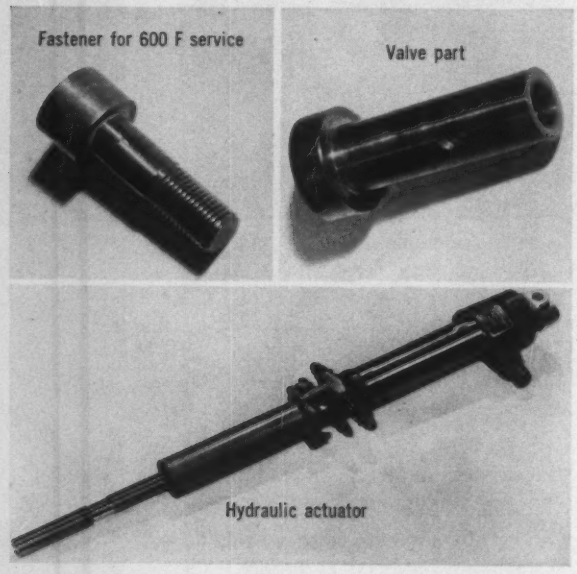
High Strength Plus Corrosion Resistance



Until a relatively few years ago, lack of a stainless steel that combined exceptionally high strength with excellent corrosion resistance forced design compromise. Manufacturers had to accept the limitations of standard stainless grades, plated low-alloy steels or use expensive non-ferrous metals. Then Armco 17-4 PH* Stainless filled this void with typical ultimate tensile strength of 200,000 psi, and corrosion resistance comparable in many media to Type 302 stainless. Manufacturers are now using this unique material for parts such as shafts for pumps, compressors, and specialty motors; studs; fasteners; and valve stems.

*Trademark

Adequate Strength at Elevated Temperatures



Higher operating temperatures and stresses in chemical processing, aircraft, nuclear reactors and other industries create the problem of finding metals with adequate properties. With typical short-time ultimate tensile strengths of 169,000 psi at 700 F, 149,000 psi at 900 F and excellent corrosion resistance, Armco 17-4 PH Stainless Steel has solved this problem in many applications. At temperatures up to 1000 F it has creep, stress-rupture and short-time tensile strengths superior to any of the standard stainless grades. Valve parts, control shafts, fasteners, aircraft components are typical 17-4 PH stainless applications.

Use the unique properties of Armco 17-4 PH Stainless Steel to give **your** products superior performance at low cost. Write us, or mail the coupon, for complete information on this special, easy-to-harden stainless steel. It is available in bars, wire, and billets. Armco Steel Corporation, 2030 Curtis Street, Middletown, Ohio.

New steels are born at Armco

Send me complete information on Armco 17-4 PH Stainless Steel. We are considering it for these applications:_____

Name_____

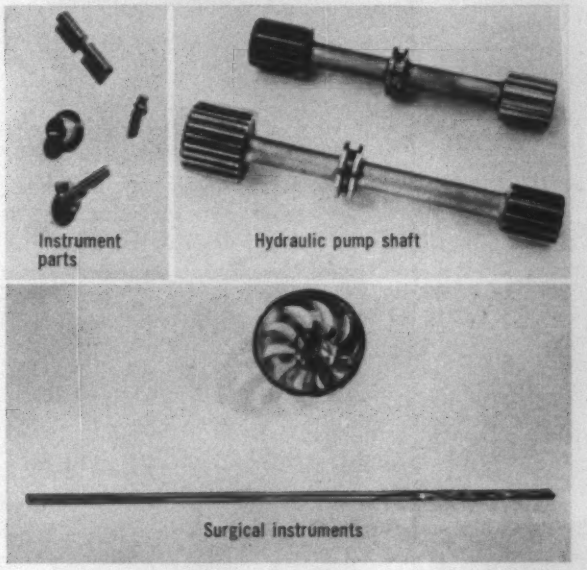
Company_____

Street_____

City_____ Zone____ State_____

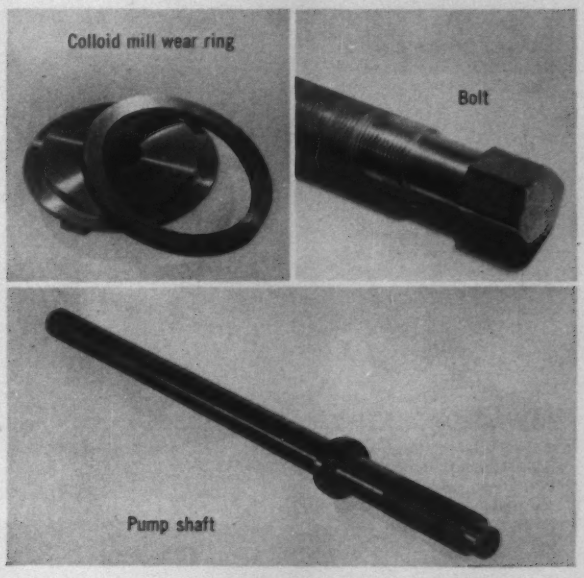
STAINLESS STEEL HELPS PRODUCTION PROBLEMS

Elimination of Distortion and Scaling



Heat treatment of standard hardenable stainless grades and low-alloy steels causes extensive distortion and scaling that requires additional expensive shop operations. Armco 17-4 PH Stainless Steel eliminates all these because it requires only a simple low temperature heat treatment. Hardening at about 900 F for 1 hour or more does away with troublesome distortion and produces only a light heat tint that does not affect dimensional tolerances. Consequently, parts can be completely finished, then heat treated. Tempering, straightening, pickling, and secondary finish machining are eliminated.

Resistance to Galling, Wear and Abrasion



By combining high hardness, up to Rockwell C44, with excellent corrosion resistance, Armco 17-4 PH offers a solution to many galling, wear, and abrasion problems. Formerly, some compromise was necessary because of the limitations of standard stainless grades or expensive high alloy metals used. Now many parts requiring a corrosion resistance approximating that of Type 302 can be given galling and wear resistance that means longer maintenance-free operations. Typical applications where Armco 17-4 PH Stainless results in superior service include studs, pump shafts, valve parts, wear rings and mixer shafts.

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P-2777

FLUSH RAIL

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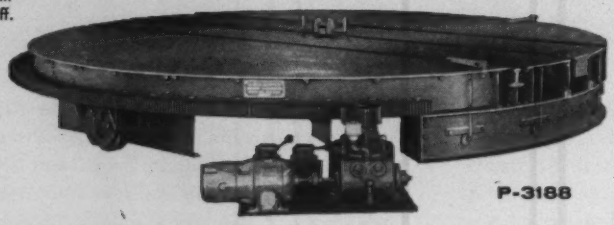
P-2805

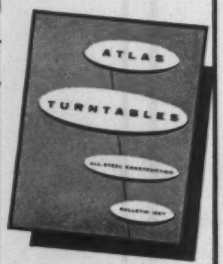
POWER-OPERATED

30-ton flush-rail, 16-foot diameter turntable designed for 90° power rotation. Power-operated mechanism moves cars on and off.



P-3188

Atlas welded, all-steel turntables are stronger, cost less than cast units. Standard sizes available to 96" diameter, but can be provided to any required size and capacity. New adjustable center bearing design reduces load on outer ball bearing raceways, greatly reducing effort needed to turn tables.



Request turntable bulletin for detail.

ATLAS CAR & MFG. CO.

1140 Ivanhoe Rd., Cleveland 10, Ohio

(Continued from P. 143)

Co.—**G. B. Doughman,** appointed manager, Producer Goods Export Dept.

Dr. J. T. Hugill, appointed manager, tonnage products sales, Air Reduction Sales Co.

W. P. Carlin, appointed director, economics, Republic Steel Corp.

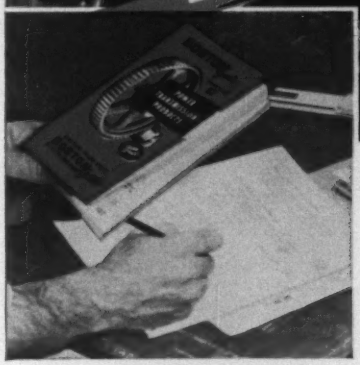
A. O. Smith Corp., Welding Products Div.—**Edward Fiore** and **Peter Magruder,** named sales engineers, New York City and Philadelphia district offices respectively.

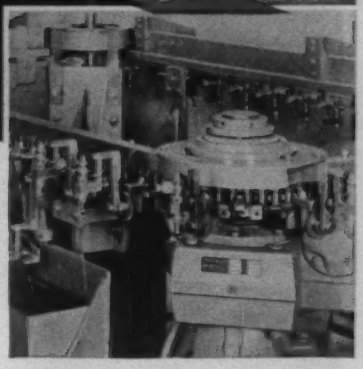
Pittsburgh Steel Co.—**R. S. Loyd,** named sales and service representative, Dallas, Tex.

The American Engineering Co., Hydraulic Div.—**L. J. Stoutenburg,** joins the company as sales manager.

Hill-Chase & Co., Inc. — **J. B. Owen,** appointed manager, sheet and strip sales

Vulcan Containers Inc. — **H. F. Krickl,** has been named to head technical sales-service.





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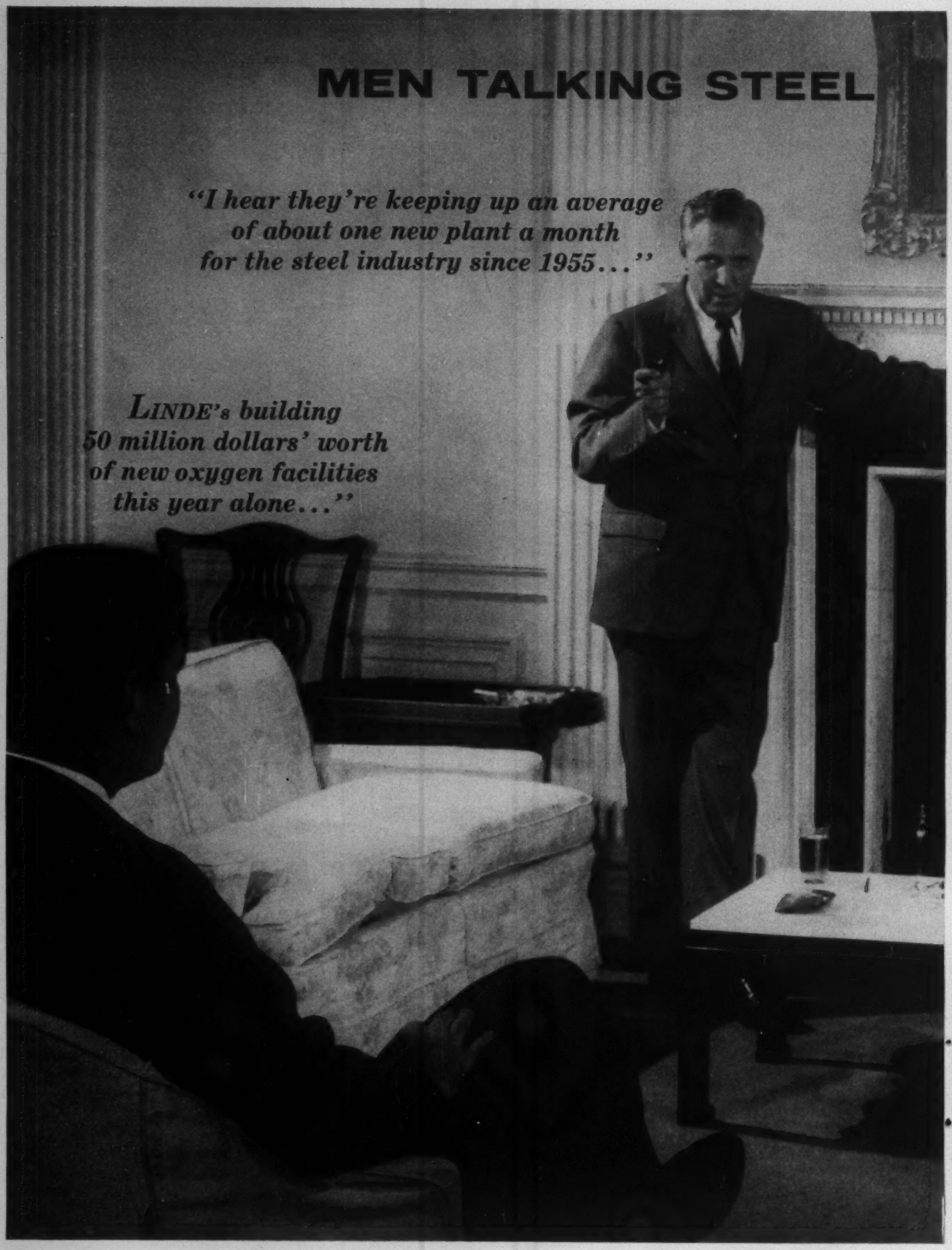
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LINDE's building 50 million dollars' worth of new oxygen facilities this year alone..."

ARE TALKING LINDE OXYGEN

"Our LINDE on-site plant has been on the line for three years. We always had enough oxygen—even when the power supply was interrupted..."

"Things are moving fast in the news these days."

For the full story on how LINDE applies *total gas technology* to on-site plants for steelmakers, write Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada,* Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

LINDE COMPANY

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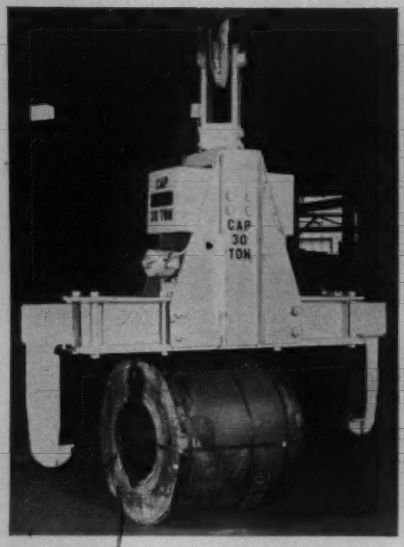
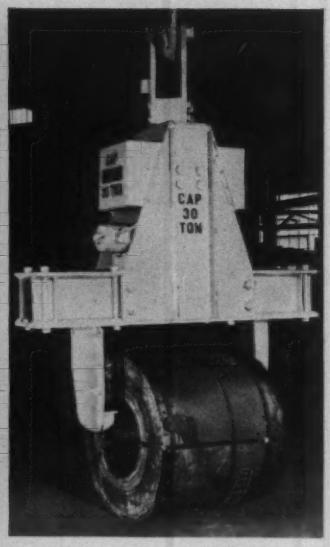
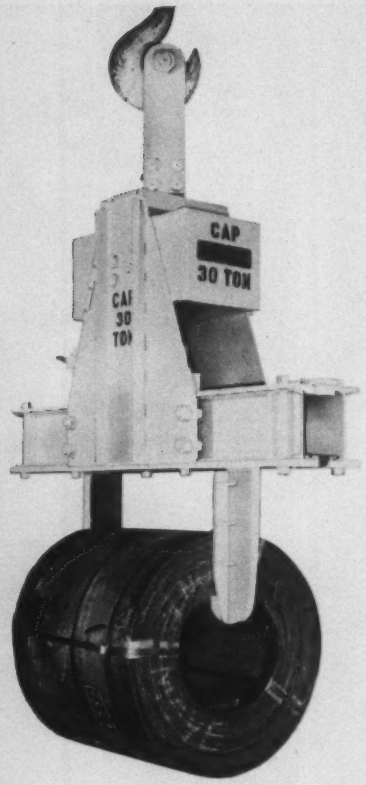




Telescoping rack-and-pinion design allows lifter arms maximum opening of 84 inches, minimum of 18 inches. Includes horizontal rotation to any position during 360° turning . . . pushbutton controlled by the crane operator.



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New Low-Carbon Steel Fills Gap In Porcelain-Enamel Industry

For years, enamelers have used a ground coat on steel to prevent boiling and fishscaling.

Now a new one-coat porcelain-enameling steel does away with the ground coat. As a result overall enameling costs have tumbled 15-30 pct.

■ A new one-coat, direct-on, porcelain-enameling steel has gained wide acceptance throughout the metalworking industry. Called Bethnamel, the newcomer was introduced a little more than one year ago by the Bethlehem Steel Co., Bethlehem, Pa.

There are five major reasons why Bethnamel handles diverse needs. In many cases, direct-on cover coating saves from 15-30 pct of enameling costs.

Bethnamel contains virtually no carbon. As a result, it forms a panel that's free from sag, distortion, boiling and fishscaling.

Wide Choice — Any of several pretreatment methods for direct-on enameling can be used with the new enameling steel. All of these methods are simple. A rundown appears in table form. The wide choice of methods speeds a changeover to Bethnamel, with little change in existing equipment.

Bethnamel also serves for two-coat enameling work. This means that a manufacturer doesn't need separate stockpiles or separate orders of enameling steel.

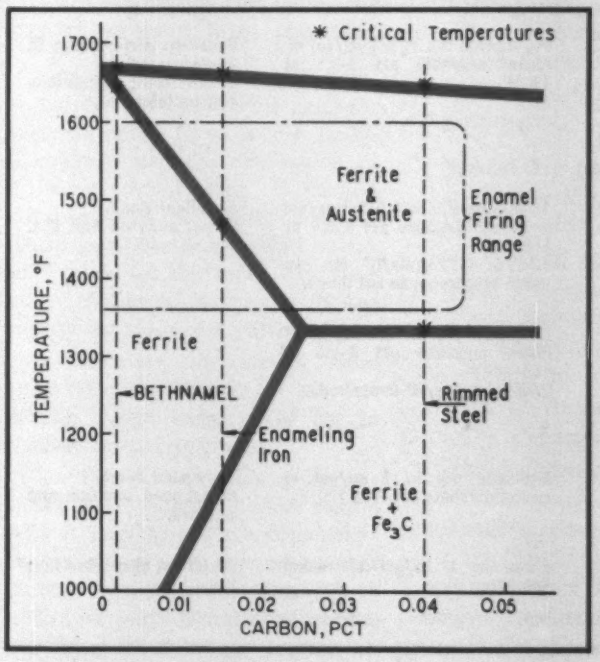
The last, but not least, major advantage is that Bethnamel costs no more than ordinary enameling stock.

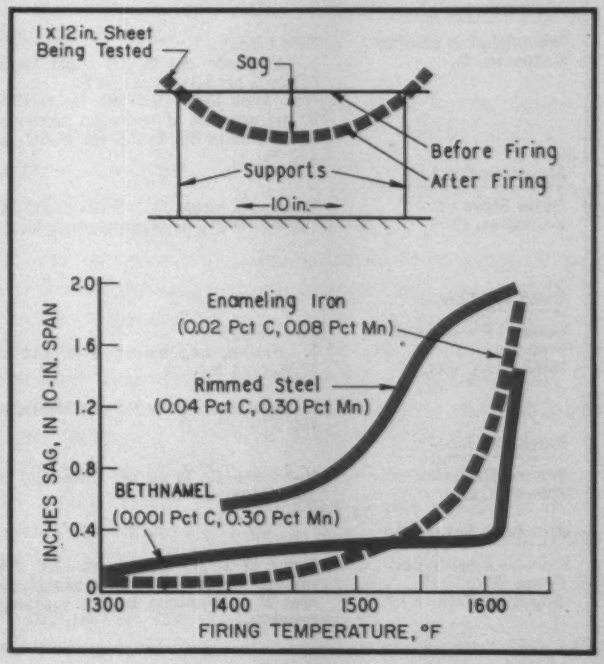
Porcelain enameling centers on the firing of glass-like compounds to a steel's surface. In this process the steel is first drawn or fabricated into its final form.

Fused Frit — Next, the formed part is cleaned, pickled, and often flash nickel-coated prior to enameling. Enameling is simple. A slurry of ground-up enamel, called frit, is applied to the steel. This frit dries and fuses to the steel at heats ranging from 1350°-1600°F.

A porcelain-enameling steel must be free from distortion and sagging when its heated to the firing

Newcomer Doesn't Sag at High Firing Heats





temperature. There are large changes in dimension when a steel transforms from ferrite to austenite. These changes take place as the steel is heated and then cooled. Of course, this contributes to distortion and sag.

Let's examine standard cold-rolled steels. These steels contain 0.08 pct carbon or more. Their transformation temperature is about 1330°F. This is well below the firing heat for porcelain enameling.

For this reason, standard cold-rolled steels don't exhibit good sag resistance. Even enameling iron, which contains about 0.015 to 0.025 pct carbon, must have a very low manganese content to insure good sag resistance.

No Carbon Problem—Bethnamel has a carbon content of about 0.003 pct or less and a standard manganese content of about 0.30 pct. Thus, it withstands heats above 1600°F. The influence of carbon content is plotted versus temperature in a self-explanatory chart.

Another chart depicts Bethnamel's sag resistance over the entire range of enamel-firing heats.

Glass and steel aren't inert materials at porcelain-enamel firing heats. They react with each other in quite a few ways.

One of these reactions involves the carbon in the steel and the oxides that compose the glass. This reaction liberates carbon monoxide or carbon dioxide. The gas bubbles through to the surface of the molten glass and leaves pimples or craters. This spoils the enamel's appearance. Enamelers call this problem boiling defects.

Since Bethnamel contains almost no carbon, the boiling problem is a thing of the past.

Hydrogen Causes Pressure—Another reaction involves water contained in the enamel frit and the steel. This reaction forms iron oxide and hydrogen. The iron oxide dissolves in the enamel, and some of the hydrogen dissolves in the steel.

However, the solubility limit of hydrogen in steel decreases with a reduction in heat. It reaches a point that's almost nil at room temperature.

Thus, hydrogen which is dissolved at the firing heat tries to escape from the steel after it cools. Escaping hydrogen builds up pressures beneath the enamel. As a result, the enamel fractures and small pieces pop off. Enamelers call this condition fishscale.

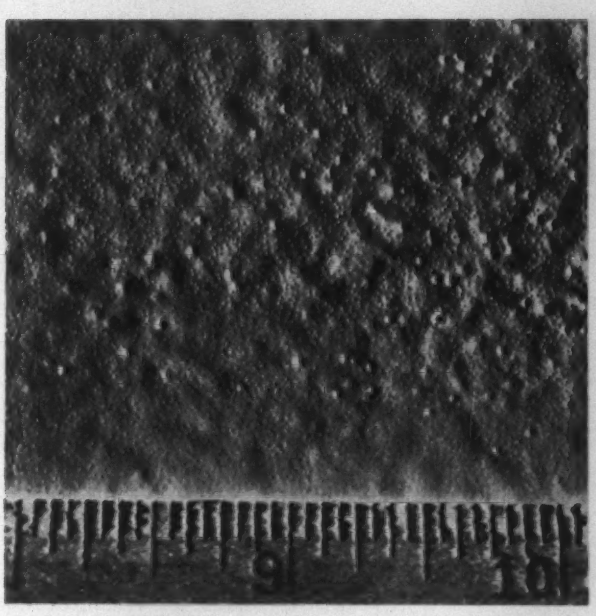
With Bethnamel the tendency of hydrogen to escape is low. Why? Again, the answer is low carbon content.

Consider Other Steels — When traditional steels are used for enameling, boiling and fishscaling are overcome by firing a blue ground-coat enamel on the steel; then applying the cover coat over the initial coating. The blue ground coat is a special compound. It soaks up the gases that cause boiling and fishscaling.

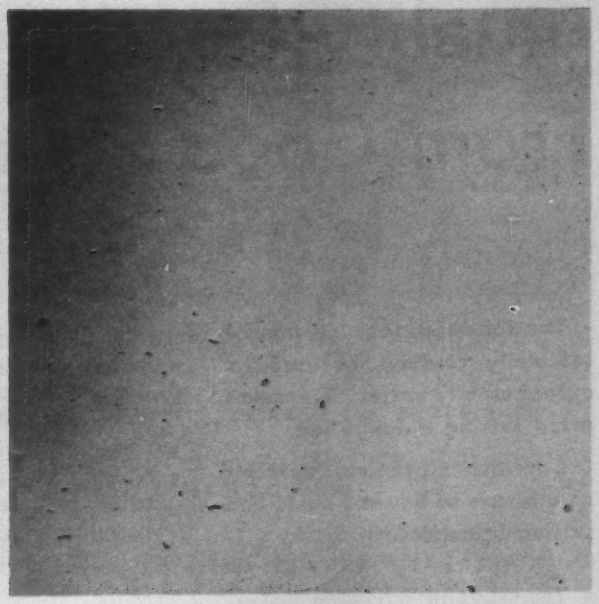
The ground coat also contains nickel and cobalt oxide. These ad-

Major Enamelers Use Various Pretreatments

ENAMELER	METAL REMOVAL METHOD	NICKEL DEPOSIT METHOD	REMARKS
Automatic Dip Line			
Westinghouse Electric Columbus, O.	Two Steps: 1. 2-minute dip in 3.5–5 pct ferric sulphate pH 1.1–1.4 at 170°F. Iron kept below 0.9 pct by feeding 33-pct solution of hydrogen peroxide. 2. 3-minute dip in 7.5 pct H_2SO_4 at 165°F.	6⅔ minute dip in 2½ oz/gal of nickel sulphate pH 3-3.1 at 170°F.	Excellent performance in Heliarc welding. Wider firing conditions can be tolerated.
Automatic Dip Line			
Roper Stove Co. Kankakee, Ill.	24-minute pickle in 7–9 pct H_2SO_4 at 165°F. 2–2½ gr of metal removal.	15-minute dip in 1.5–2.0 oz/gal of nickel sulphate pH 3–3.4 at 170–175°F. 0.12 to 0.15 gms/ft² Ni—too much and trying to cut down.	Excellent Bond. 92 pct okay on first fire.
Batch Dip Line			
Geuder, Paeschke & Frey Co. Milwaukee, Wis.	Two Steps: 1. Prefire, i.e., oxided 4 minute at 1200–1225°F. 2. 6-minute dip in 7–8 pct H_2SO_4 at 150°F.	12-minute dip in 1.25 oz/gal of nickel sulphate pH 3–3.5 at 155–160°F. 0.08–0.12 gms/ft² deposited.	
Batch Dip Line			
Warren Refrigerator Atlanta, Ga.	10-minute dip in 10 pct citric acid at 180–195°F.	6-minute dip in 1 oz/gal of nickel sulphate pH 3 at 170°F.	Very good bond. 90 pct good, one coat and one fire.
Automatic Spray Line			
General Electric Co. Range Div. Appliance Park, Ky.	Spray in 20 pct phosphoric acid 2½ minutes ferrous ion conc. of phosphoric kept at a minimum by ion exchange tower.	Spray in 1 oz/gal of nickel sulphate.	90–95 pct okay after first fire.



BOILING DEFECTS: Carbon-monoxide or carbon-dioxide bubbles, from excess carbon, spoil the finish.



HYDROGEN PROBLEM: Escaping hydrogen builds up pressure and causes pieces of the enamel to pop off.

ditives promote good bonding of the enamel to the steel.

For years, the porcelain-enameling industry has wanted to omit the ground coat. They prefer to apply the cover coat directly to the steel. Obviously, this saves a lot of time and money.

Not only do they save the cost of the ground-coat enamel, but a dual bonus is realized by eliminating the cost of an extra firing operation.

Less Equipment—Use of Bethnamel does away with the need for separate spray lines or dip tanks. Combined with the elimination of a firing step, plant production capacity may be nearly doubled. These gains are partly offset by the application of the more expensive cover coating to both exposed and unexposed sides of a part.

Nevertheless, the credits more than offset the debits. In fact, net savings range from 15-30 pct in overall enameling costs.

Until now, this juicy plum has never been obtained. The reason why is easy to explain. Enamelers had to use special, expensive steels or very costly pretreatments.

In the past, the cost of special steels has offset the gains made on the direct-on, cover-coat enameling. More costly pretreatments center on the use of cold-rolled rimmed steels to offset their costs. The low-carbon rim on these steels does prevent boiling defects; but it doesn't overcome sporadic fish-scaling and poor sag resistance.

Bethnamel solves these problems because it costs no more than enameling iron. And it gives a good, reliable appearance in direct-on, cover-coat enameling. Add to these benefits a third factor — superior sag resistance.

Special Treatments — Any steel that is to be direct-on coated must undergo special treatments to promote bonding with the cover-coat enamel. Nickel and cobalt oxides promote bonding with a ground coat. However, these oxides can't be present in cover-coat enamels. Why not? Because their presence imparts a characteristic color.

The function of the oxides must be taken over by other means. Sometimes these special treatments are applied in the steel mill. This boosts the cost of the steel. Other times, treatment occurs in the enamelers' shops.

Equipment and facilities in enamelers' shops differ. This means that various pretreatments have to be developed to promote direct-on adherence. Bethnamel meets success with all of these methods.

Deposit Nickel Layer — The table, referred to earlier, lists pretreatment methods used by five major enamelers. Other methods, not listed, yield good results in trial runs.

All methods have two things in common. They remove more metal than the usual pickle and they deposit a nickel layer on the pickled surface.

It's worthwhile to consider one more factor. Let's look at Bethnamel from the shop man's viewpoint. The enameling stock has good Heliarc- and spot-welding behavior and it draws and roll forms very well.

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Quality Ductile Iron Results From Good Foundry Control

By **G. A. Kramer**—Chairman of the Board, The Advance Foundry Co., Dayton

The job-shop foundry cannot set daily routines because its output usually varies. This makes price setting a tough job.

Consider statistical controls as a means of figuring costs and setting schedules.

■ The secret of success in making good ductile iron is absolute control over the melting facilities and procedures. For the job-shop foundry, it's almost impossible to set a daily routine for definite amounts of ductile iron.

Speed is a necessity in the casting of the many types of ductile iron. But speed never takes precedence over quality control. High quality ductile iron requires the utmost skill in control at all stages of production.

Develop Goals—Sand preparation, material control, melting and pouring, plus all other jobs must be coordinated. If their control is integrated, the foundry becomes efficient and flexible.

To develop this goal, initiate a carefully planned program of quality control based on statistics. Gather inspection, testing and analysis data every day on every shift. A central control group can correlate the results on standard tables and graphs.

Careful analysis of this data indicates the over-all condition of ductile production. It also points up trends in capacity potential within departments and serves to evaluate each job.

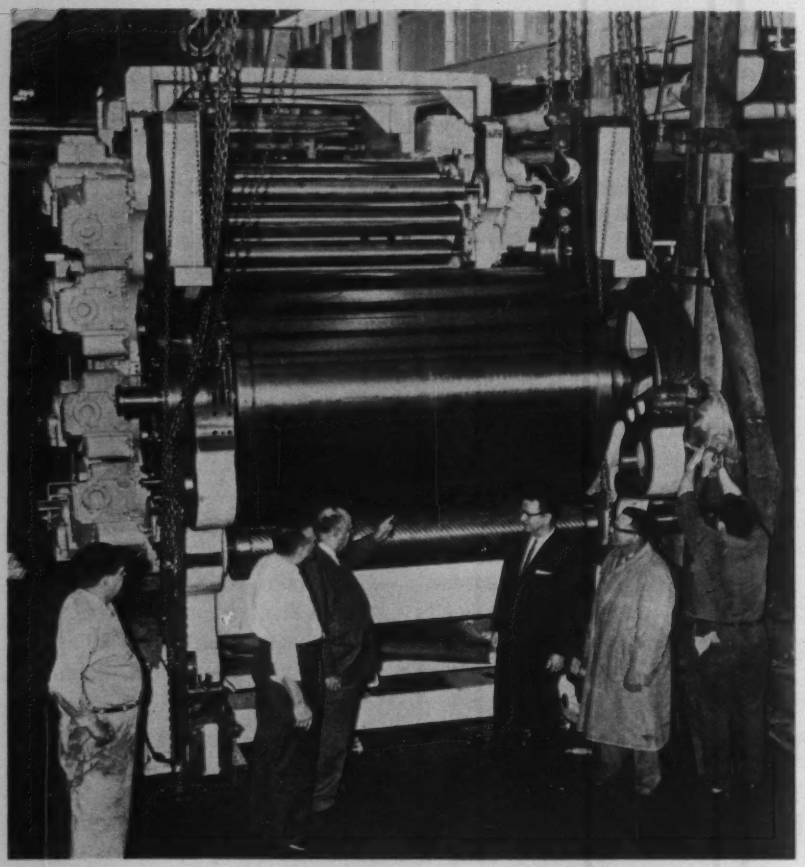
This assists in realistic price setting and intelligent scheduling to meet the maximum number of customer demands.

A Good Example — Recording ladle analyses once every four charges, provides a common denominator. It's easier to plot and it fits into most standard control charts.

Place the complete foundry process under control by making regular checks on the sources of quality variation—raw material, machines, men and methods.

Pouring Ductile — Ductile iron does not seem to flow as much as it rolls. As a result, the first iron into a mold will proceed from the gate to the other end of the mold, and then back again. The process repeats until the mold is full. Always keep in mind that the hotter ductile iron is poured, the better the results.

The humidity control helps control the carbon. Of course, because ductile iron is a very high carbon iron, it is not necessary to consistently keep it low. However, the



FINISHED PRODUCT: For the larger ductile iron castings weighing upward from 400 lb, a special annealing operation isn't really necessary.

proper type of pig iron is essential for making good ductile iron.

The mechanical features in charging the furnace are exactly the same as standard iron—everything happens after the iron is out of the spout.

Set Clockwork—If each man is alerted to the exact process, the time from spout to mold will be kept to the minimum. Quick pouring results in a better job.

It's the metallurgical engineer's duty to see that all ladles are preheated and in position, that the alloying elements are ready, that the skimming needs are set up ahead of time.

Naturally, the introduction of alloying elements and the passing of iron through the air reduces temperature. If this is reduced too far, it would result in a casting that looks like a laminate.

Lighter Risers—There is no unusual technique that must be adopted in the actual pouring of ductile iron. There is, however, one point in its favor. There is no need for a riser nearly as heavy on the ductile iron castings. Ductile iron doesn't shrink nearly as much from a risering standpoint as do other irons.

This fact does not change the standard ⅛ in. shrink rule for the over-all casting. But ductile iron does not seem to need the feed-up iron that other irons do.

As ductile iron spread to larger commercial sizes, there was much hesitancy regarding its use because of the prevailing opinion that it had to be annealed before it was used.

Actually, for the larger type castings weighing upward from 400 lb, if the proper care is taken in allowing them to sand anneal, and not to shake them out too soon, further annealing isn't necessary.

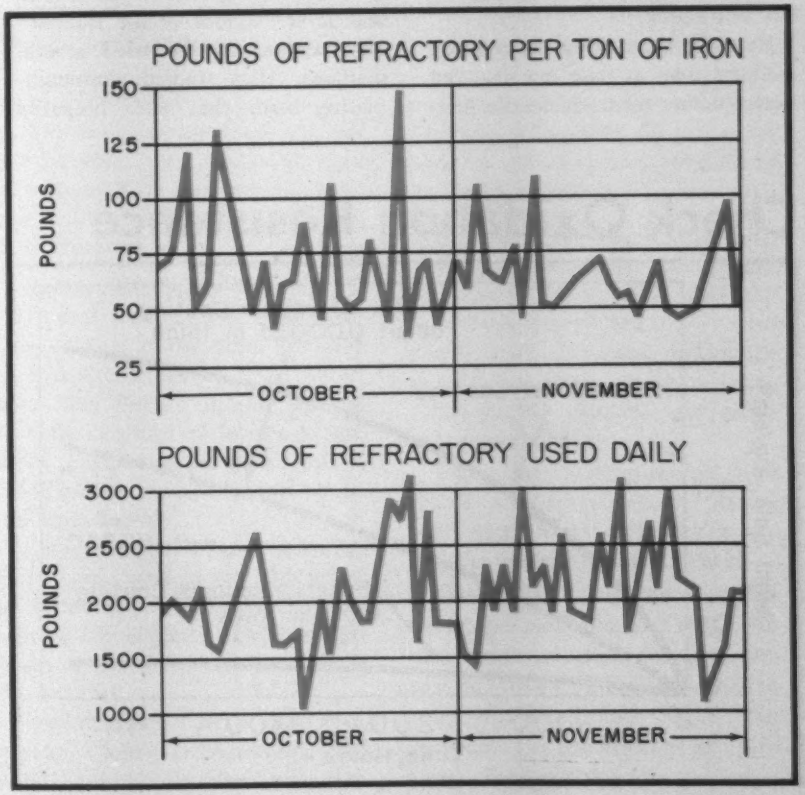
Proper Design—Designers need not change their thinking when working with ductile iron. Frequently, however, they try to combine heavy and light sections with tragic results. The more uniform the metal section, the better the casting will be.

Many times engineers want to strengthen a casting by putting a heavy rib on its side. Actually, they're defeating the purpose. The rib to which it is joined may be a lighter section and the rib will feed from that section rather than give to it.

Develop Statistics to Tag Costs

1. **Plot a curve to determine the average volumes of the melt zone and the stack zone in the cupola.**
2. **Average the melt temperatures at the pouring spout for each shift.**
3. **Average the melt rate per hour for every shift.**
4. **Determine the amount of refractory consumed per day in terms of metal poured.**
5. **Make analysis of each ladle during pouring. Project and plot in terms of every four tons of metal poured.**
6. **Plot weekly screen analyses of sands' reclaims and raw stock.**
7. **Plot weekly physical properties of basic sand blends.**

Check Refractory Consumption



Nickel-Aluminum Alloy Coatings Resist Corrosion at 1000°C

Nickel-aluminum alloys have good corrosion resistance. But they're also very brittle.

The NBS has found a way to use this optimum corrosion resistance—while reducing overall forming problems.

■ Cast nickel-aluminum alloys provide good corrosion resistance. For this reason, many designers look to these alloys for protection from atmospheric exposure. These alloys offer designers another bonus. They maintain their hardness at high temperatures.

However, brittleness presents a problem. Since nickel-aluminum alloys aren't very ductile, they can't be easily fabricated into complex shapes. But there's a way around this bottleneck.

By using these alloys as coatings —rather than as base metals—and electroplating them on ductile metals, very useful corrosion-resistant shapes are obtained.

Durable Service—The National Bureau of Standards, in a program sponsored by the Wright Air Development Center, has taken the bull by the horns. The Bureau has devised a method for making high-strength nickel-aluminum coatings. These coatings protect metals from oxidation at heats up to 1000°C.

The most durable coating revolves around a two-stage process. First, nickel is electroplated over the desired base metal. Then aluminum is plated over the nickel at 700°C. The base metal can be steel, nickel or molybdenum.

In an attempt to find suitable plating conditions for forming a smooth, oxidation-resistant coating of nickel-aluminum, D. E. Couch and J. H. Connor of the Bureau's electrodeposition lab tried several methods. They studied aluminum-plating baths that were prepared from organic solvents. They also looked into baths made from fused salts.

Satisfactory Dip — An ideal method centers on electrodepositing nickel from a Watts-type bath. This method is simple. It features a mixed chloride-sulfate bath.

After the bath, aluminum is electroplated on the nickel layer—at a current density of 2-15 amp per dm^2.

A fused-salt solution deposits the aluminum at 700°C. This solution consists of several salts. The mixture contains potassium chloride, sodium chloride and cryolite. The latter is a sodium-aluminum fluoride.

At 700°C, the aluminum diffuses into the nickel layer. As it's deposited onto and into the nickel, the aluminum forms the corrosion-resistant alloy.

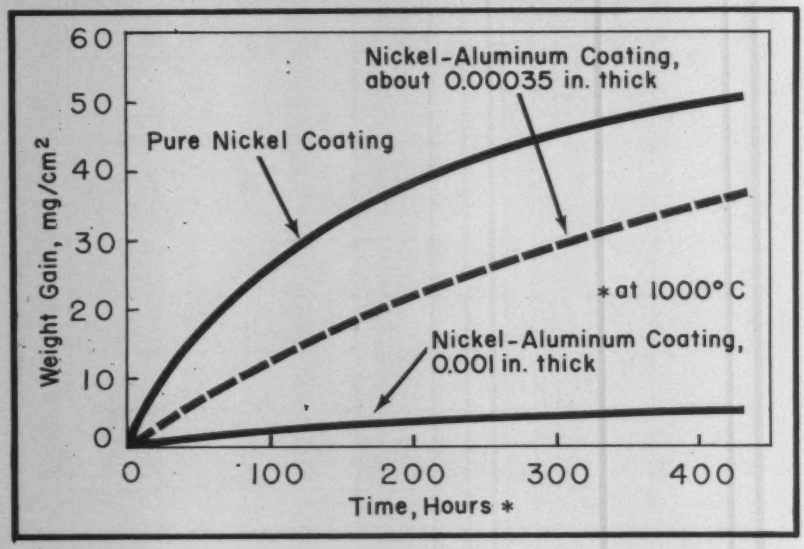
Good Adhesion—In the cryolite deposition, nickel-plated samples are placed in the bath inside a graphite container. These samples and their container are heated to the bath's temperature prior to electrolysis. Excellent adhesion is obtained on nickel and on previously-prepared, nickel-aluminum alloys.

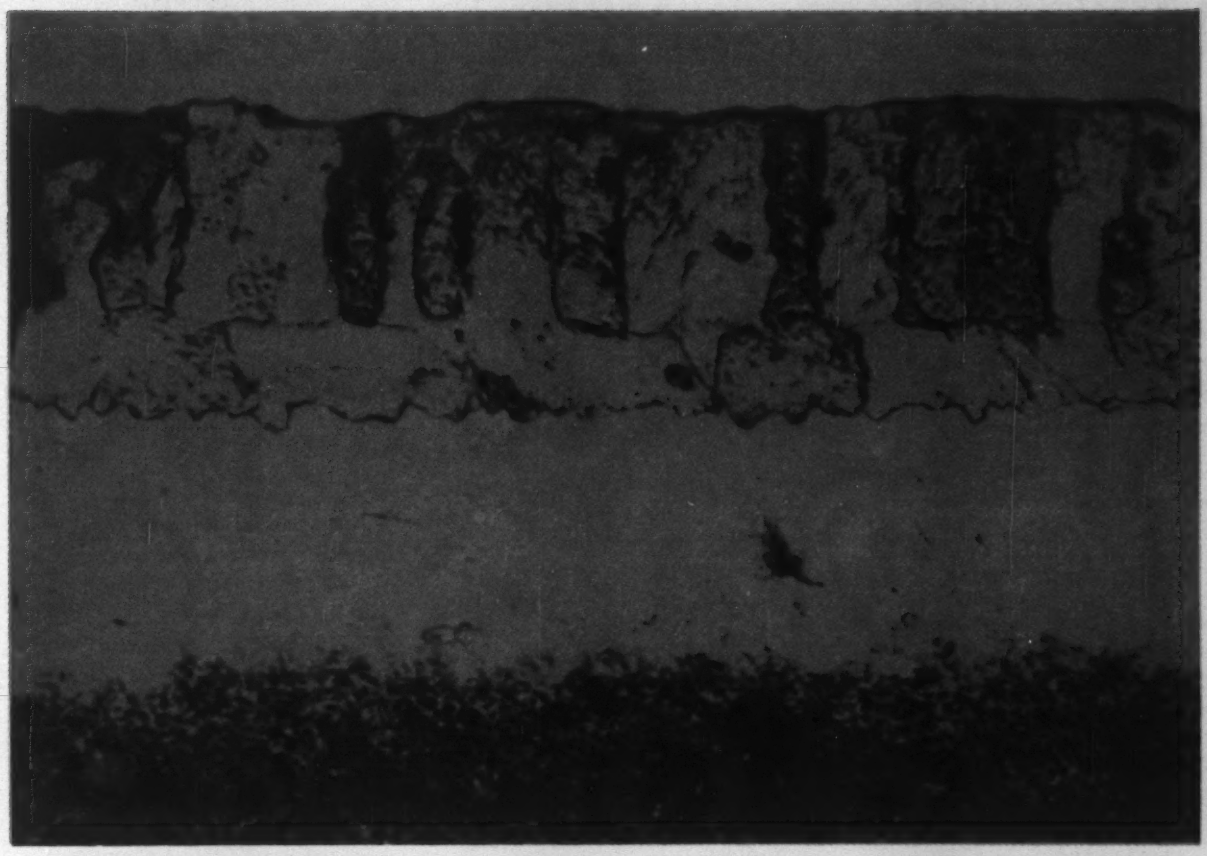
Use of a current density of 7 amp per dm^2 for 5 minutes, at 700°C, yields an aluminum deposit that's 0.00025 in. thick. When electrolysis is continued for a longer period of time, the aluminum is electrodeposited at a faster rate.

However, in such a case electrodeposition occurs too fast. As a result, all the aluminum can't diffuse into the nickel. The excess aluminum drips off the bottom of the sample.

Heavier Coatings—Thicker deposits result when a lower current

Check Oxidation Resistance





ALLOYS AT INTERFACE: Nickel-aluminum alloy is produced in a sodium-chloride, potassium-chloride, cryolite bath at 700°C. This deposit, magnified several hundred times, resists salt spray and oxidation.

density is used for a longer time period. You also get thicker deposits by operating at a higher temperature.

Now, let's consider another vexing problem. What about objects that require coatings, but can't withstand the high heat of the cryolite bath?

Mr. Couch and Mr. Connor have found a solution to this problem. They suggest an alternate plating method. Here's a quick rundown.

Less Heat Needed—In the alternate method, aluminum is deposited over the nickel at 160°C. This aluminum comes from a dual-mixture bath. This bath consists of aluminum chloride and sodium chloride.

Actual alloying with the nickel takes place outside the bath. The nickel-aluminum coating results after the sample is heated for a few hours at 500°-600°C in air.

Steel samples coated with the aluminum-nickel alloy have been tested by salt spray, in outdoor exposure, and in air at high temperatures. Results are good.

Resists Salt Spray — In air at 550° and 1000°C, the alloy coatings oxidize at one-tenth the rate of nickel coatings of equal thickness. The Bureau is also pleased with the coatings' resistance to salt spray. Panels that are plated by the cryolite-bath method prove to be the most durable.

Let's examine a case in point. Steel panels were coated with 0.002 in. of nickel and 0.0005 in. of aluminum. These panels withstood 300 hours of salt-spray tests before they showed rust.

Rapid cyling of these panels between room temperature and 550°C did not affect their corrosion resistance. When the aluminum thickness is less than 50 pct of the total coating thickness, even better resistance is exhibited.

Prevent Corrosion — Corrosion studies, conducted on atmospheric-exposure racks, correlate well with the salt-spray tests. The alloy-coated panels don't show any rust at the end of one year. In comparison, nickel-plated samples rust after only four months.

These alloy coatings protect steel, nickel and molybdenum. Future tests may prove that they're applicable to other metals.

Coatings 0.002 in. thick protect steel from oxidation at 550°C; but they aren't adequate for long service at 1000°C. Why? Because the iron diffuses through these thin coatings. Thicker coatings are now being checked out.

How New Openhearth Technique Doubles Steel Output

By **G. A. Ferris**—Mgr., Openhearth & Electric Furnaces, Ford Motor Co., Dearborn, Mich.

Since the first announcement of the new Ford-steelmaking process, there's been a wide call for more details.

A description of the technique brings to light some interesting aspects.

■ Ford Motor Co. has been experimenting with openhearth steelmaking. Sparking this research is the need to more fully develop the potential of the openhearth.

Much progress has been made. Results show that a new process reduces by one-half or more the time to make a ton of steel by standard methods in the same furnaces. Best results have been 70 tons per hour on a 200-ton furnace and 105 tons per hr on a 400-ton furnace.

Calls for Speed—The Ford process emphasizes speed of both cold and hot charging. Other vital aspects include: the use of 50 pct hot iron; very high firing rates during hot-iron charging; the extensive use of oxygen thereafter.

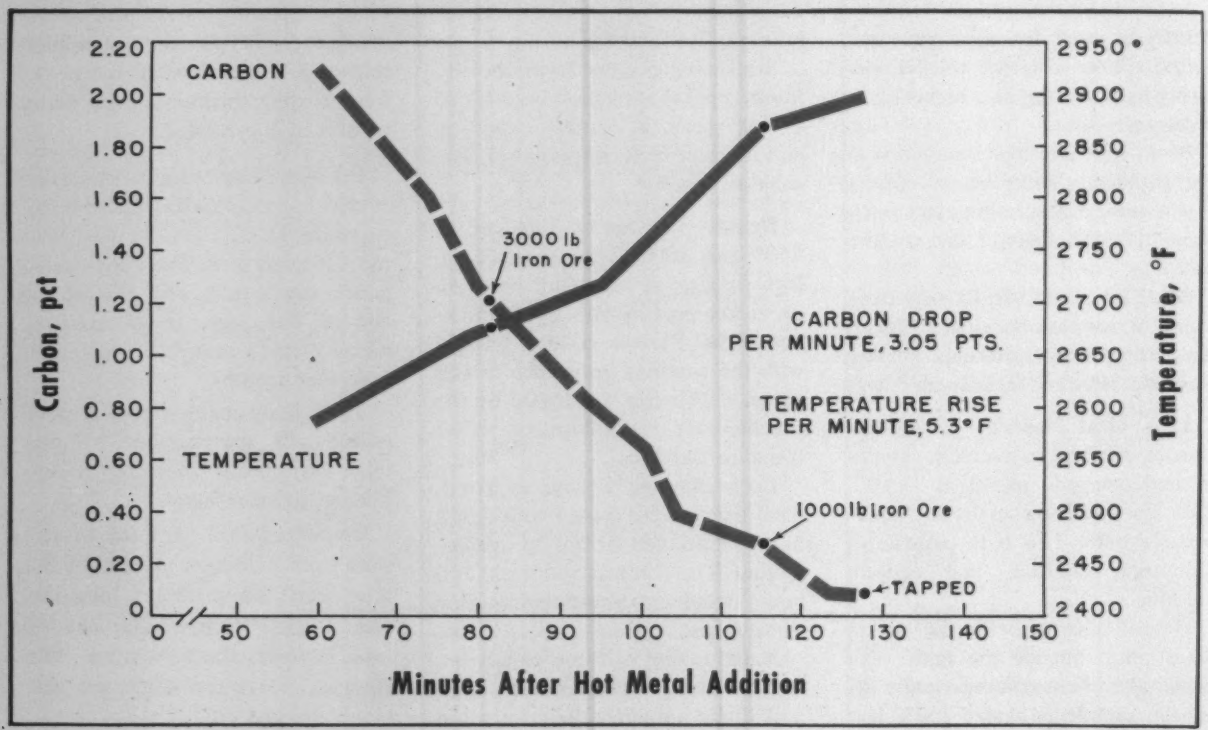
Let's run through a typical heat produced on the 200-ton furnace. This furnace is controlled automatically in regard to fuel-air ratios, reversals, and pressure control. Bath depth is 30 in.

There are two oxygen-fuel roof lances and standard end burners. Fuel used is bunker C oil through the end burners and natural gas supported by oxygen through the roof lances.

Use Special Lances — Designed by Air Products, Inc., Allentown, Pa., these oxygen-fuel lances have six ½-in. hole openings with the holes 30 degrees off vertical.

Either oxygen alone to the extent of 60,000 cu ft per hr, or oxygen, mixed with a maximum of 30,000 cu ft of natural gas per hr may be delivered through these lances. Using maximum volume results in

Operating Data Point Up Response of Heat



a flame temperature greater than 4500°F.

The charge in this heat consists of 6500 lb burnt lime, 225,000 lb scrap, and 220,000 lb hot metal.

Sandwiches the Lime—Speed of cold charging is an important factor. Thus, scrap density and high uniform buggy weight take close attention. The total cold charge is contained in 13 buggies and is delivered to the furnace in one drag. As for the charged lime, it's spread over the hearth and sandwiched between the scrap.

Maximum firing goes on during charging. End firing is at the rate of 14 gallons of oil—enriched with 5000 cu ft of oxygen—per minute.

The roof lances are lowered about one foot through the roof during the charging period. Their input is 30,000 cu ft of natural gas, mixed with 48,000 cu ft of oxygen per hour. This represents 190,000,000 Btu per hour.

Total cold charging time at this point is 23 minutes.

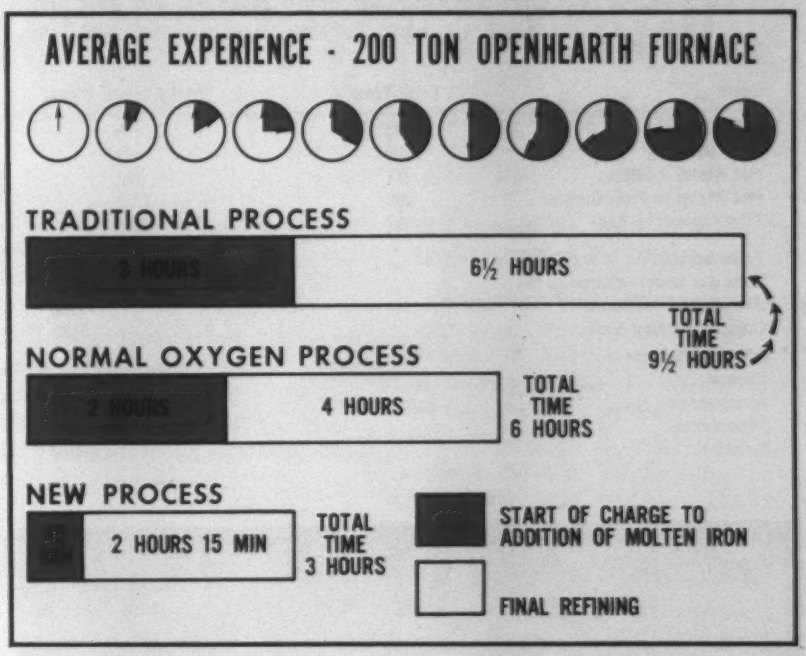
Follows Scrap Level — After charging, the roof lances are lowered to a point two feet above the scrap. And as the scrap melts down, the lances continue to lower. At the same time, the doors are immediately banked with a front-loader.

Now, only 32 minutes after the start of charging, hot metal is added to the furnace. This early addition is one of the most significant parts of the new practice. Why? Because in spite of the firing rates used, melting has not yet reached its normal stage at this time.

It takes 11 minutes to add two ladles of hot metal. The elapsed time from start of charge to the end of hot metal addition is now 43 minutes.

Turns Gas Off—Now the finishing and refining cycle starts. Natural gas is turned off; only 48,000 cu ft of oxygen comes in through the roof lances which are rapidly lowered to about 4 inches above the bath. This lance level is maintained throughout the remainder of the heat.

New Process Speeds Production



Oxygen exits from the lance at 1000 fps. Instead of a splash, foaming occurs. This is significant. It indicates that higher oxygen flows could be used without excessive damage to refractories.

Adjusts End Firing—Scrap protruding through the bath disappears rapidly after hot metal is added. In the meantime, end firing slows to a low of two gallons of oil per minute. Use of oxygen through the end burners stops.

Thirty minutes after hot iron addition, end firing virtually ceases. Flushing begins and continues until bath carbon reaches a level below 1 pct carbon. During this period, the furnace runs with maximum draft to control slag temperature.

Frequent carbons and temperature checks are taken throughout the heat. The first readings, taken only 60 minutes after hot iron was added, checked 2.09 pct carbon and 2585°F. At 82 minutes, 3000 lb of iron ore was added.

Prepares for Tapping — At 115 minutes after hot metal, carbon was 0.28 pct and temperature 2870°F. At this time, 1000 lb of iron ore was added. Preparations for tapping then began.

Eight minutes later, the carbon had dropped to 0.08 pct and the temperature was 2890°F. Finally, the heat was tapped 127 minutes after hot metal.

The total charge-to-tap time was 2 hr and 50 minutes. Produced were 198.8 tons or a rate of 70.2 tons per hr. Total charge-to-tap fuel was 1,368,000 Btu per ton. Total oxygen consumption was 1575 cu ft per ton.

Needs Attention — A point to remember is that this heat was carried on in an experimental manner. True, it was given special attention. But any openhearth that travels at this rate needs close melting attention.

Only one major problem comes up. It's the ability to approximate the cold charging time referred to in this heat. This problem has always plagued the openhearth. But it's not insurmountable.

How'd it Start? — The original work began with a 100-ton heat in a 200-ton furnace. A standard limestone and ore charge, with 70 pct hot metal, was used. But the heat

Adds Hot Metal Early in Cycle

200-ton Furnace

Cycle	Total Time	Total Elapsed Time
Cold Charging	:23	:23
Door Banking	:09	:32
Hot Metal Addition	:11	:43
Hot Metal to First Carbon	:60	1:43
First Carbon to Tap	:67	2:50

Tons tapped	198.8
Tons per hour – charge to tap	70.2
Btu per ton, million	1.368
Oxygen per ton, cu ft	1575
ANALYSIS, pct	
Carbon	0.055
Manganese	0.29
Phosphorus	0.007
Sulphur	0.020

CHARGES EARLY: New process allows iron to be charged by 45 minutes —rather than 2 hr as with normal oxygen process—after heat starts.

size had to be reduced because of concern over the ability to contain the high heat — due to oxygen — during the ore boil.

The next heat was of normal size. But burnt lime was substituted for limestone; initial charge ore was eliminated; the amount of hot metal was cut.

It appears that this reduction of high-heat absorbing reactions tends to reduce the total heat time to more than offset the extra cold charging required.

Reduces Slag — Elimination of the ore charge also tends to reduce the volume of the flush slag. As a result, yields appear to be the same as normal openhearth oxygen-lance heats.

Results of this series of tests also indicate that no end firing is required during the refining and finishing stages of the heat. In spite of the low fuel rate on this heat, much fuel was wasted. The reason: tradition seems to force melters to maintain some fuel on the furnace.

Varies the Scrap—Much research remains to be done. Current work includes: varying the proportions of light to heavy scrap and charging ore in combination with burnt lime.

The early addition of hot metal in combination with high oxygen usage is, as mentioned earlier, a vital aspect. Considering the total fuel input per ton, it appears that this practice gives maximum use of the chemical heat developed.

Experiments will, thus, be run adding a small amount of hot metal during the scrap charging period.

A New Openhearth—What will be the outcome of all this experimental work? One day, there'll be a new type of openhearth. It will have high oxygen-fuel input both above and below bath level.

It will not have checkers. There'll be drafting both ways, perhaps through two boilers. Hot iron will be charged first.

Such a furnace will combine the high production traits of other processes with the flexibility of the openhearth.

New Units Speed Rail Welding

Boxcar-Mounted Welder Also Performs at Laying Point

With the accent on service, one company points to new equipment that speeds welding time and cuts manpower needs.

You can buy the equipment or the complete welding service.

■ New rail welding equipment points up a major breakthrough in railroad engineering. The equipment speeds welding time and slashes manpower needs by more than 40 pct over methods previously used.

From the moment new rail is placed on the storage racks, it is automatically controlled through the entire welding process. Linde Co., Div. of Union Carbide Corp., points out that the unit is effective on both a fixed or mobilized job.

Senses Need — Automatic rail handling cars select the rail from the racks and carry it to the production line at a speed of 40 fpm. The units then shuttle back to the rack for another pickup.

Equipped with a series of sensing units, these cars know when and where new rail is needed. The sensing devices also signal the car to stop if a workman should accidentally step in the way.

Once on the line, the rails are automatically checked for camber by a series of air pressure devices. As this occurs, guide plates align the rails in an end finisher.

Squares Rails — Critical tolerances are held as the gage side of the rail is aligned to 0.015 in. Meanwhile, the top of the rail ball is aligned to a tolerance 0.025 in.

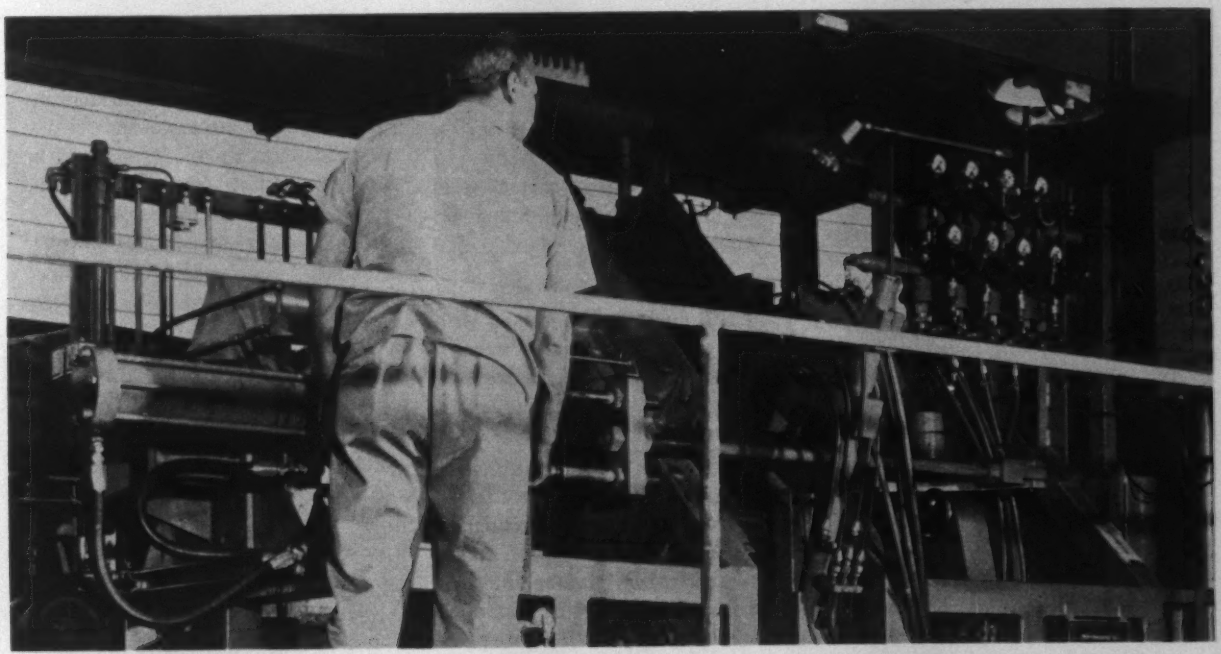
An abrasive belt squares the rail end assuring that there is no deflection of excess metal. When the lead end is squared, the rail moves on for treatment of the trailing end.

Important Step—Next, and most important is the welding itself. Aligned by a series of dies, the rail is abutted against the trailing end of the previously welded rail.

End pressure of about 3000 psi secures the joint. At the same time a welding head surrounds the rail ends and heats them to a plastic state, fusing the ends together. This forms a pressure-welded joint.

The rail now a continuous length, advances to the grinding machine by means of a power pinch roller. Here in one operation the excess metal caused by the upset is removed from the ball, base and web of the rail.

After the welds are inspected, the rail is loaded aboard flat cars and transported to the laying point.



UPSET WELDING: Pressure of about 3000 psi forces the rail ends together while the welding head which surrounds the joint heats the metal to a plastic state. Grinders remove the excess metal while it's still soft.

SPOT CHECK: After the test sample is poured, it goes to the lab. Full report comes back in 10 minutes.

Spectrometer Speeds Analysis At Up-to-Date Steel Mill

What was yesterday's lab instrument often becomes today's production tool.

Here, a spectrometer keeps constant watch on steel production to maintain quality.

■ Today, more than a year after its dedication, Acme Steel Co.'s $35 million Riverdale (South Chicago) plant is running full speed ahead. As one of the nation's largest producers of steel for specialty items, Acme is called upon to fill multiple small orders. Often, these orders must meet rigid and exacting specifications.

From a quality control point of view, part of that success is due to the plant's modern metals lab. It features the latest equipment including a Baird-Atomic direct-reading spectrometer for obtaining quick, accurate analyses of heats.

Such process design combines for the first time continuous hot blast cupolas with oxygen conversion steelmaking. As a result, Acme can produce many heats of varying steel grades in the same equipment on the same day.

Big Role—This achievement of speed and flexibility combined with a high degree of quality control would be difficult indeed were it not for the speed and accuracy of the spectrometer.

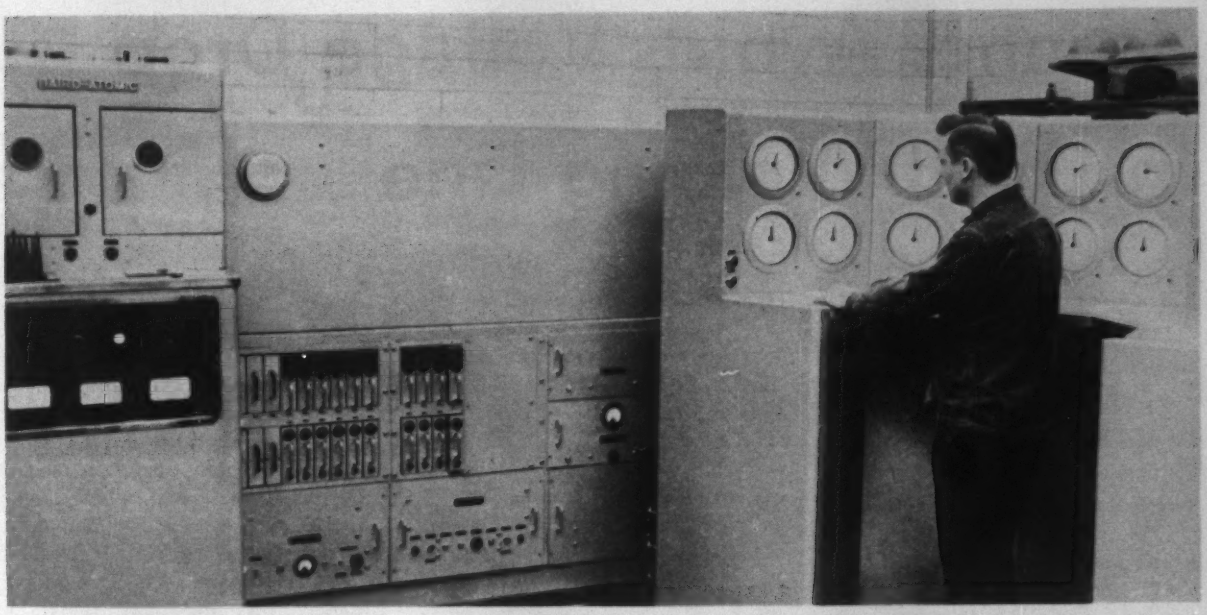
Although the use of this instrument in steelmaking is not new, Acme's use of the direct reader is unique in at least one respect. While other steelmakers prefer modern spectroscopy to wet chemistry to save time, money or for other advantages, there was really no choice in the case of Acme Steel.

With a tap-to-tap time as short as 40 minutes coupled with rigid specifications, it was vital that the most rapid, accurate equipment and methods for chemical analysis be used. Induction furnaces are used to analyze carbon and sulfur.

The direct reader checks all other elements, in iron and steel as well as slag. With this setup a complete steel analysis can be reported in six minutes.

Fast Cycle—Here's how Acme uses the direct reader. First, the melt shop workers draw a sample of metal or slag on a preset schedule, then deliver it to the lab. At present, the following samples come in from six sources.

They include: two cupola iron samples per hour; one cupola slag sample per hour; one sample from hot metal mixer per heat; two pre-



THOROUGH ANALYSIS: Spectrometer analyzes elements in steel along with the slag constituents.

liminary heat samples (average); one converter slag sample per heat; and two ingot samples for minimum ladle analysis.

In all, it amounts to nine samples per hour or 72 per shift. Ten elements are determined in each metal sample and six in each slag sample. Based on the above figures, this amounts to some 656 determinations per shift. With added samples submitted from the main lab, the total per shift comes to 700 or 750.

Return Trip—As soon as the lab personnel cool the sample and prepare the surface, they run it on the spectrometer. Then the results are recorded and reported to the operating people.

The total time elapsed is generally five to ten minutes. Actual time depends on whether a partial or complete determination is required.

Iron and steel samples are analyzed for carbon, manganese, phosphorus, sulphur, silicon, copper, nickel, chromium, molybdenum and tin. Slags are analyzed for calcium oxide, silica, manganese oxide, magnesium oxide, alumina and iron.

The Right Track—Results are reported back to the melt shop where the cupola and converter operators use the analyses as a guide to make adjustments in operating conditions. Because of the quick analysis, operators can adjust the formulation to meet specifications squarely.

After all additions are made and the heat of steel has been tapped into a ladle, more samples are taken as the steel is being teemed into the ingot molds. Samples are taken from No. 2 ingot, one of the middle ingots, and the last two full ingots. These samples provide the official analysis of the heat (ladle analysis) and also indicate the uniformity of the heat.

At Acme, the direct reader operates 24 hours a day, 7 days a week. Because there is no wet lab in the melt shop to function as a standby in case of equipment failure, reliable operation of the instrument is a "must."

Acme wisely provided standby power supplies and a standby control chassis in addition to the spare amplifier and relay drawers supplied by Baird-Atomic. These, coupled with intensive maintenance, have kept the few periods of downtime to matters of minutes.

Acme Steel's melt shop is under the direction of R. E. Nelson, chief chemist. The direct-reading unit is maintained and calibrated by the company's spectrographer, L. Nadalka.

READIES EACH SAMPLE: First stop for every specimen is the belt sander. Here, samples are given uniform surfaces prior to final analysis.

Scanner Avoids Voltage Drop In Giant Welding Line

The power required to run a battery of resistance welders is often a drain on the power source. How to control it?

An electronic brain is at work at one huge operation. The device sees to it that the right welding current is delivered.

■ Imagine the horsepower you could generate by opening the throttles wide open on 570 compact cars. Convert this energy into electrical units and you'll come up with 45 million watts. That's what happens on one huge production line when all 24 resistance welding machines work at one time.

The problem here is voltage drop. Simultaneous firing of the 24 machines results in a voltage drop of about 18.6 pct—enough to hinder weld quality. Engineers on the job are now limiting the voltage drop to about a safe 5.2 pct.

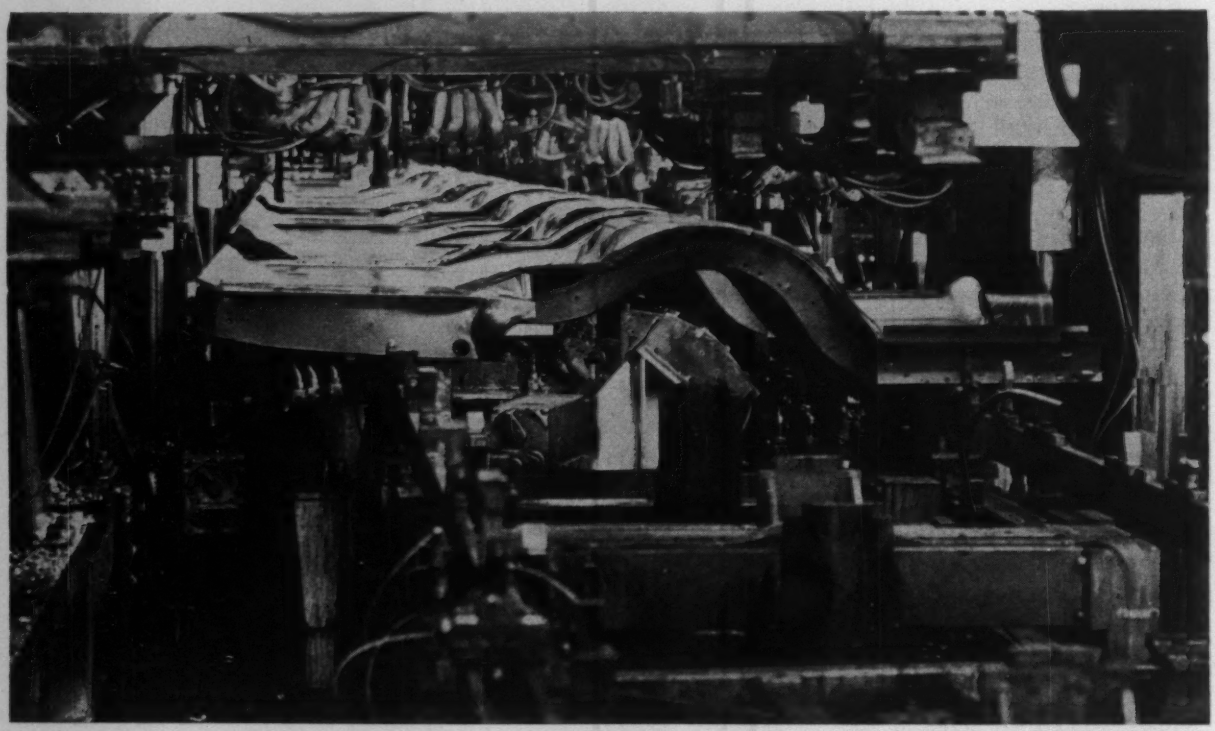
How is it done? An electronic scanner makes sure each welder is ready for firing and the timing sequence has been altered just enough to keep the operation within safe limits.

Many Jobs—The scanner itself automatically searches, controls, regulates, times and even keeps a record on the largest automatic welding assembly line in the auto industry. It's at work at Chrysler Corp.'s giant stamping plant in Twinsburg, Ohio. This electronic brain scans each of the 24 welding units 320 times every second.

Engineers examined the problem closely. They determined that four of the 24 welders made up a grand total of 9600 kva. By firing these heavy press welders in three separate bursts, voltage drop could be made more realistic. At the same time, the whole operation would lose only one second, wholly compatible with production demands.

At Chrysler, the scanner is called the "magic wand." As soon as the scanner gets the okay signal, it permits individual firing of the 24 units so fast that the human eye cannot detect the intervals. In this way, more than 860 spot welds are created to form the rails and floor pan assembly of most Chrysler-made cars.

"T" Formation—The line is 658



UNITIZED BODIES: The largest automated unit-body floor pan assembly line uses fast shuttles to speed rail and floor pans to welding units. Engineers have reduced voltage drop during welding from 18.6-5.2 pct.

ft long. At the extreme tip of the T-shaped line, sheet metal is welded into inner and outer rails and becomes a ladder assembly. At the other extreme, center floor pans and rear floor pans are also welded together before they reach the center of the "T."

Both ladders and pans speed along large shuttles from one welding machine to another. During the mating process, vital structural cross members are welded to the floor pan and ladder assemblies. As each shuttle arrives at the welder, the part is raised up to meet the electrodes by mechanical press welders.

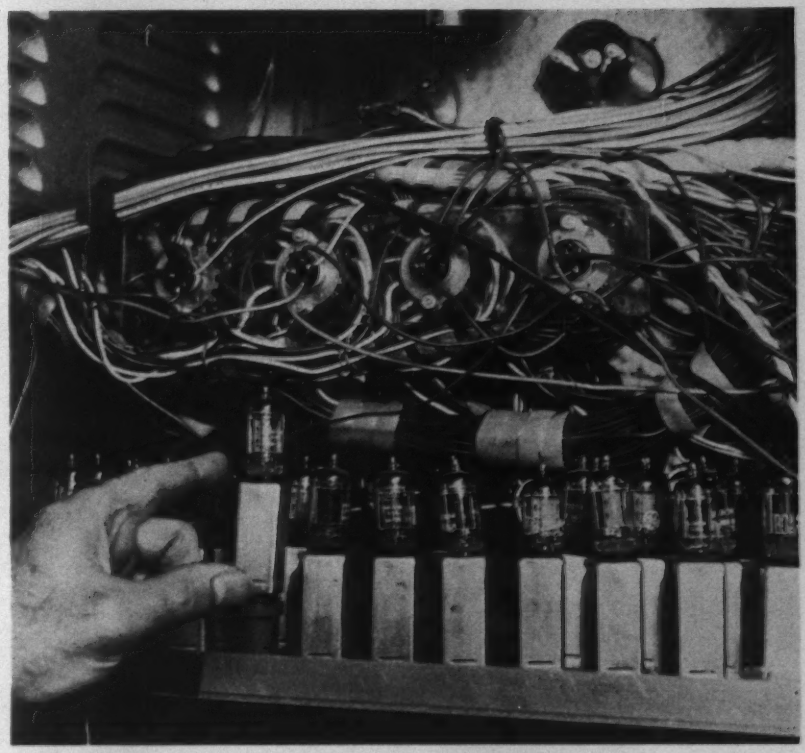
Electronic timers watch every move of this process. For example, there's a squeeze timer which gives ample time for the metals to be squeezed together for the electric shock. Another timer holds the part under pressure until the molten metal solidifies.

Weld When Ready—If a given machine fails to fire and send in a "finish" signal within a three-second interval, the scanner turns on a red warning light, then moves on to fire other welding machines. What happens if quick repairs are impossible? Then the entire assembly moves to a duplicate assembly line where there's another scanner.

During a single eight-hour shift, 2000 rail and floor pan assemblies can be completed. Any change in the shape of the assembly can be arranged in 20 minutes. At present, the line handles seven different car pan shapes.

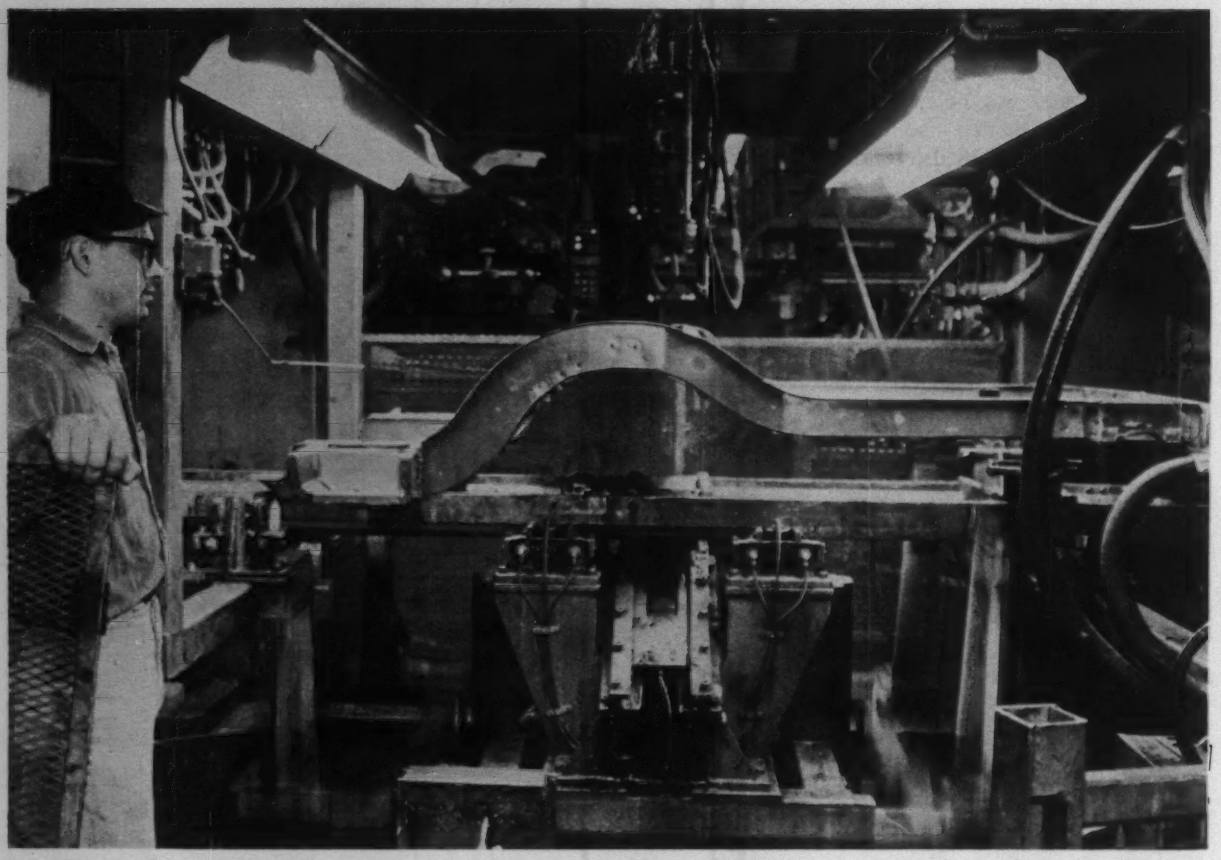
The two rear floor pan assembly lines comprise 80 welders. They range in size from 100 to 2400 kva. These lines consist of six main steps. Included are outer rail assembly, inner rail assembly, rail marriage, ladder assembly, center pan to rear pan skin assembly and final assembly.

The Reason Why—The basic reason for not permitting the four large press welders to fire simultaneously was the cross drop in voltage created at other welders fed off the same substation. It also



MAGIC WAND: Pride of the Chrysler stamping plant is its electronic scanner which controls the entire unitized floor pan assembly line.

MARRIAGE OF PARTS: Rail assemblies speed along shuttles to their eventual marriage with floor pans—at a rate of 2000 assemblies per shift.



WELDING STATION: One of the welding units awaits arrival of floor pan assembly which is being shuttled at high speed beneath it. The electronic brain scans each welding unit 320 times every second.

meant an added cross drop in the transformer that supplied power to welding equipment in other areas in the plant.

Several factors come into play in voltage drop. That drop which a welder produces on a distribution system is called "self drop." Any drop that occurs at a given welder as a result of other welders fed from the same system is known as "cross drop." Total or aggregate drop is the sum of self drop plus cross drop.

You can correct self-drop by raising the transformer tap setting and/or increasing the weld timer setting. On the other hand, you can't compensate for cross drop.

There's a Limit—Good welding practice can accept voltage drop up to 10 pct. The reference here is to cross drop. Engineers were aware that they could not maintain consistent quality control due to the cross drop that occurred within the battery of 24 press welders.

As a result, the scanner filled a vital need. It is also solving quite a few design problems. Suppose it's known that a certain welder has a slow cycle time. The scanning unit simply asks the slow unit twice as often if it is ready to fire.

Simple as this sounds, from a design standpoint that was just one of many such problems that added to the complexity of the unit. Also, right next to the basic control unit is a fully-wired and "ready-to-operate" scanner. It was built and installed as a standby for emergency use in the event of scanner malfunction.

Modular Design—All basic parts are built on a modular plug-in basis. The scanner runs at lightening speed, moving from one welder to another in 120 millionths of a second.

Just how big is the welding setup? More than 3½ miles of armored coaxial and 3-conductor cable are used for power feeds to the many welders. Over 10 miles of control wire and secondary service drops were also used on this installation.

In the Package—Scanner parts include such items as tubes, relays, brain cells, pulse generators, transfer circuitry, drive amplifier, "and" module, matrix and a "still fire" gate.

Total connected load amounts to 55,140 kva of welder nameplate rating. All welding transformers used in this setup are either Type B (65 kva) or Type C (100 kva).

About 12,415 kva of the total load was fed from an existing substation previously allocated as door line assembly operations. The rest of the load is serviced from four 2000-kva distribution transformers.

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Cold Rolled Sheets
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Plates (5/16" *and lighter*)
Electrical Sheets
Electric Weld Line Pipe
Spiral Welded Pipe

The solution to a gap in your steel inventories is a spot order to Acme-Newport, where it gets utmost dispatch consistent with highest quality. Red Circle Service is possible because of this mill's unusual flexibility in scheduling, its modern facilities and methods, its dependable laboratory checks throughout the steel-making process. The bright Red Circle appearing on every rush order gains the attention of all eyes at Acme-Newport and gives you red carpet treatment all down the line. Tell us what you want and when you want it. We'll take it from there!

Acme-Newport Steel COMPANY
NEWPORT, KENTUCKY
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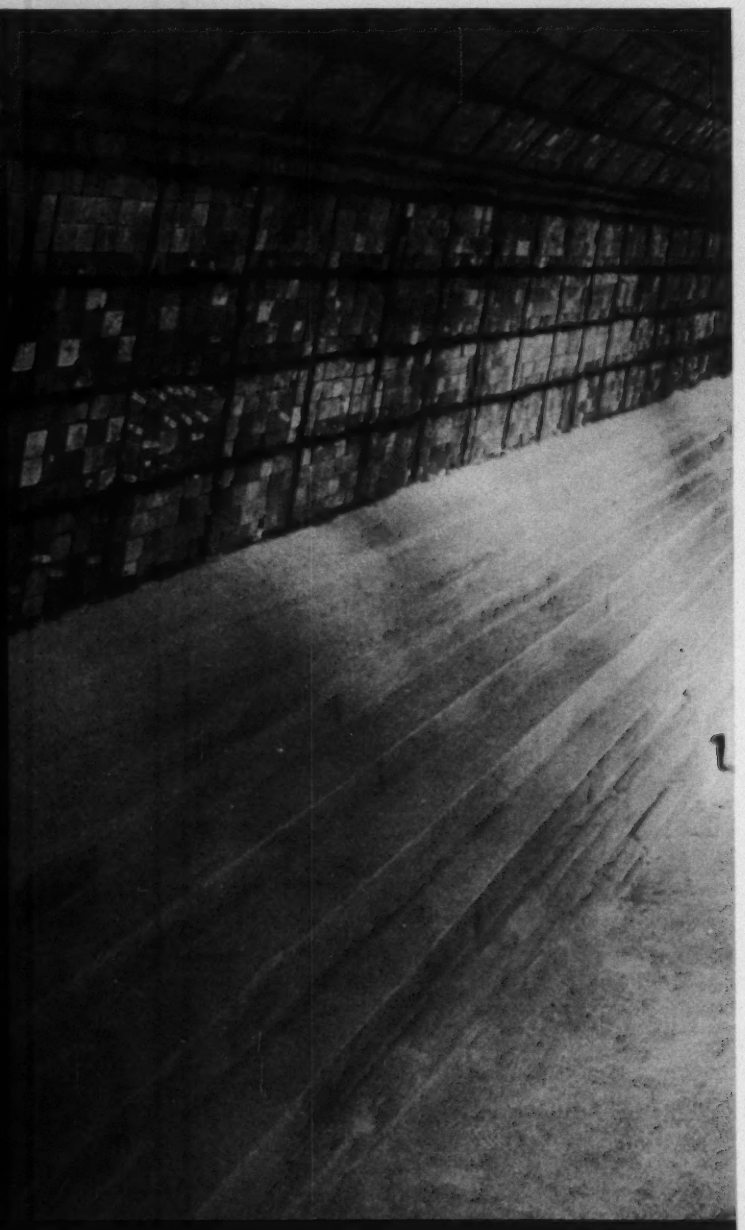
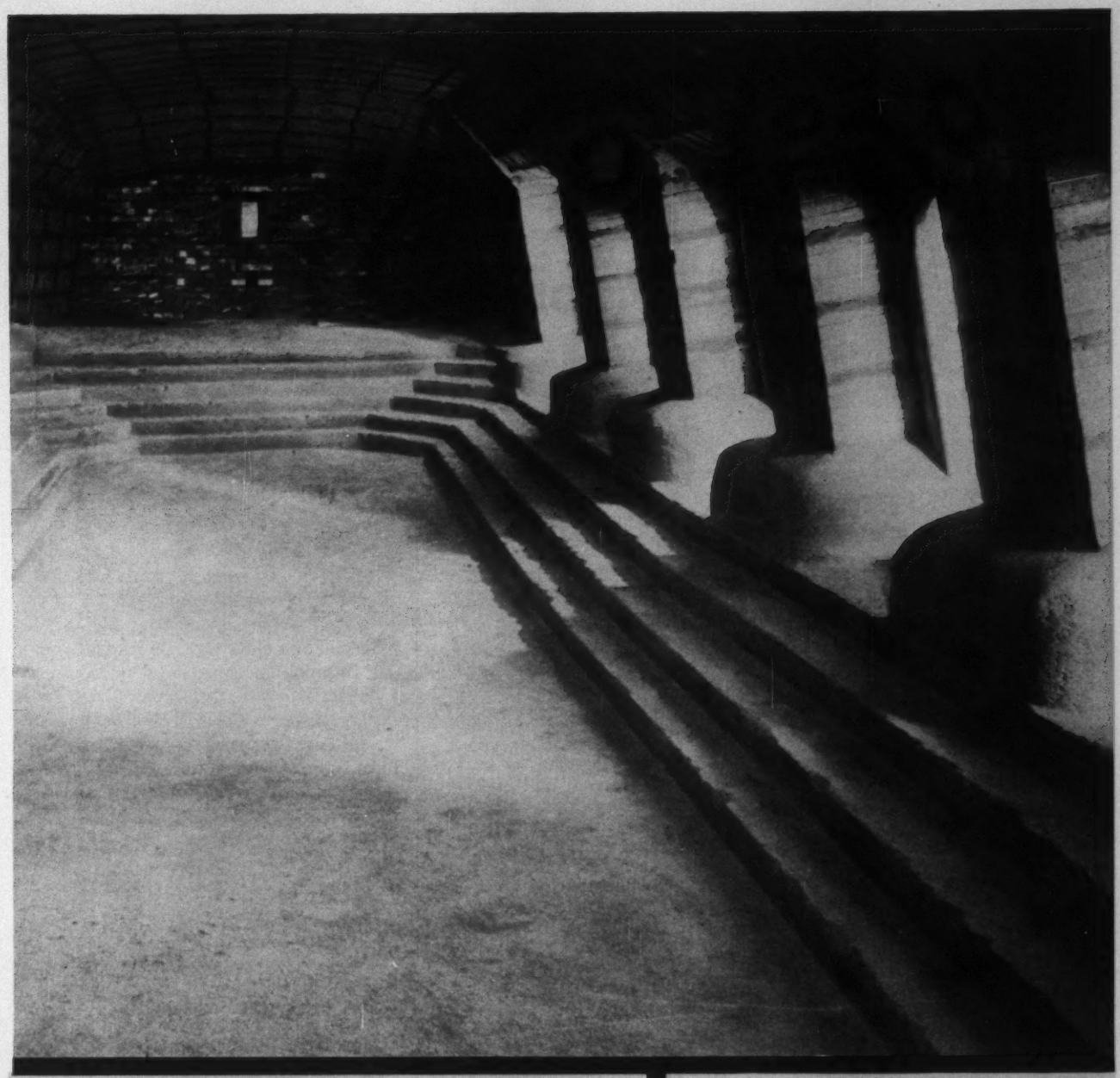
PERMANENTE 165 BOTTOM HELPS MAKE THIS AMERICA'S MOST MODERN O.H. FURNACE!



The furnace shown here is the recently completed number 5 Open Hearth at Keystone Steel & Wire Company, Peoria, Illinois. ● IT IS AN ALL-BASIC FURNACE, the first of its type ever to be built in the U.S. ● Keystone has established since 1954 a successful record of using basic refractories to redesign furnaces for greater capacity and efficiency. Their last of four conversions to all-basic was made in 1957, to add 80,000 tons to the annual production. Now, the new number 5 furnace adds 120,000 more and pioneers furnace design with methods proved best in six years of experience! ● Experience has proved that Permanente 165 Ramming Mix makes a bottom that lasts



significantly longer than other materials... requires fewer repairs and less down time... helps produce greater tonnage at lower bottom cost. ● Permanente 165 is made from high purity Kaiser Periclase refractory grains (94-96% MgO) and ceramically bonds itself into a crystalline mass at relatively low temperatures. This produces a bottom with maximum resistance to hydration and attack by iron oxide and slag. Its installed high density—averaging 175 pounds per cubic foot—assures longer life. ● Ask your Kaiser Refractories sales representative to show you how this superior ramming mix can help you get greater steel tonnage at lower bottom cost.

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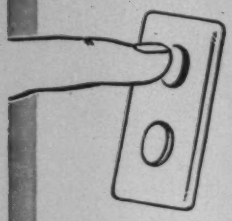

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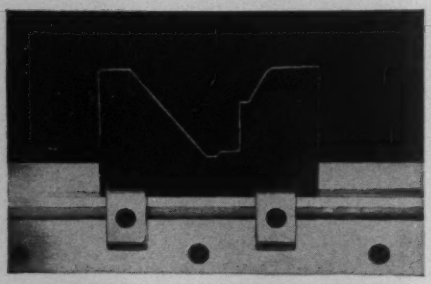
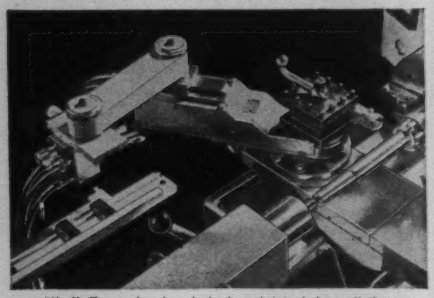


.003" template sandwiched between sheet plastic and precision cut by Mimik's exclusive Templator method, clamped ready for tracing.

New and Faster

The Templator, exclusive to Mimik, reduces tracing time still further by enabling you to produce a template on any quill type vertical mill in 45 minutes. Now you can go straight from the drawing to the finished part in two easy steps, faster than ever before and with unparalleled accuracy. The Templator and the Mimik Hydraulic Tracer give you a perfect production team geared to meet sudden switches in production and impossible deadlines.



Mimik Tracer head and single point tool does all the work. Super-sensitive stylus traces from template or master to below ±.001.

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PATENT REVIEW

New Patents In Metalworking

Puts Tops in Molds

Apparatus for setting hot tops in ingot molds, A. G. Mazarakis (assigned to U. S. Steel Corp., Pittsburgh), Sept. 20, 1960. Improved apparatus for mechanically inserting sectional hot tops in ingot molds. No. 2,952,886.

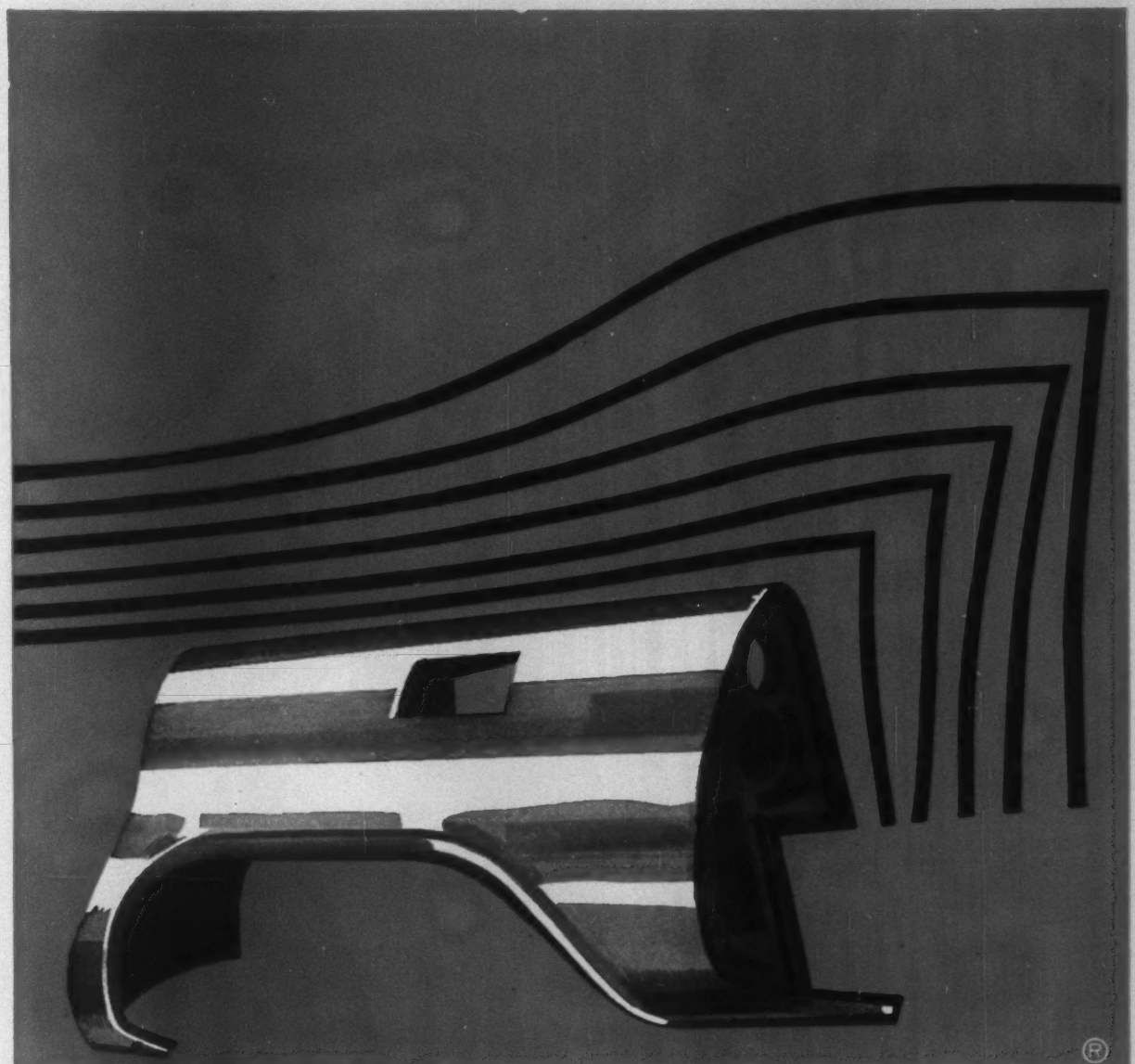
Eases Flotation

Beneficiation of ferruginous ores, R. P. Cox (assigned to American Alcolac Corp., Baltimore), Sept. 13, 1960. In the pretreatment of nonmagnetic iron oxide ores, the ground ore is conditioned with a chemical reducing agent. For example, a reducing sugar modifies the surfaces of the ore particles and renders them more amenable to froth flotation or magnetic concentration. Desliming is not required. No. 2,952,532.

Tough Steel

Deep-hardened alloy steel having improved impact strength, N. J. Culp (assigned to Carpenter Steel Co., Reading, Pa.), Aug. 30, 1960. A particular alloy steel is capable of deep-hardening from temperatures below about 1650°F. It has good toughness as-quenched or as-quenched and tempered. The alloy composition comprises 0.2-0.8 pct C, 0.5-2.5 pct Mn, 0.5-1.5 pct Cr, 0.25-1.5 pct Mo, 0.65-4 pct Cu, and the balance essentially all Fe, with critical proportioning of Cu and Mn to C. The alloy is tempered at a temperature below that at which copper precipitates, so that substantially all of the copper is retained in solid solution. No. 2,950,968.

Copies of U. S. Patents are available at 25¢ each from Commissioners of Patents, Washington 25, D. C.



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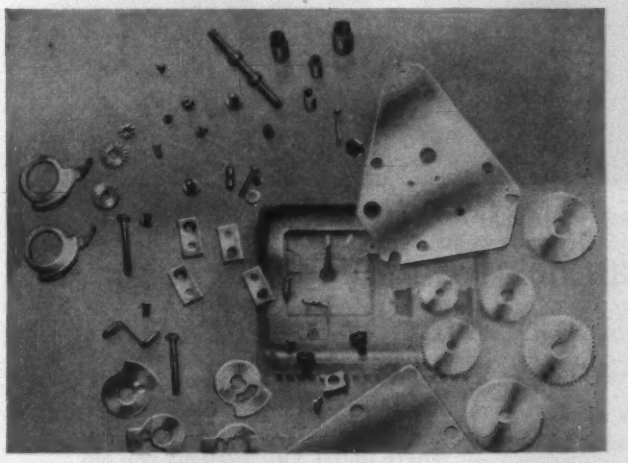
"High-speed automatic screwdriving started with Chase 3-Mark Rod"

says Grant Tuttle, Purchasing Agent of American Screw Company, Willimantic, Connecticut... maker of "Screwstick." This bright, time-saving idea loads an automatic screwdriver with a stick of screws... lets an individual operator turn out up to five times as many assemblies, compared with older methods.

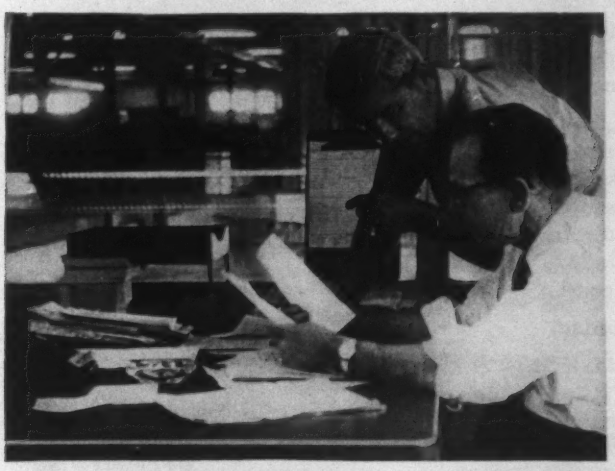
Mr. Tuttle adds: "Screwsticks are cut from Chase 3-Mark Free-Cutting Brass Rod. We insist that the rod be absolutely uniform in size to avoid jam-ups in the driver. Tensile strength of each length of rod must be uniform, too... since finished screwsticks rely on torque to snap off each screw at precisely the right instant. And end-to-end straightness is just as critical. Because no other free-cutting brass rod is so dependably uniform and straight, American Screw Company uses nothing but Chase 3-Mark Rod."

Ask your Chase representative for full details about 3-Mark, or check and mail the coupon at the right. Learn today about the finest free-cutting brass rod anywhere.

A CHASE "PLUS" for users of sheet and strip in coils... new water-resistant shrouding paper that protects metal against damage, staining, oxidation. Metal arrives in excellent, ready-to-work condition.



CLOCKWORK ACCURACY in thermostat parts comes from Chase Brass strip, with its extremely close dimensional tolerances. General Controls Company of Burbank and Glendale, California, also gets corrosion resistance, with no protective coating needed.



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New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Compressed Air

Technical information about compressed air is given in a 26-page booklet. General compressed air data, and various charts and diagrams are included. (Wilkerson Corp.)

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Surface Plates

Black granite surface plates are dealt with in a fold-out brochure. Sizes and accuracies are listed, along with accessories. Important features of the plates are also given. (Collins Micro Flat Co., Inc.)

For free copy circle No. 2 on postcard

Drillheads

Multiple-spindle drillheads are dealt with in a 28-page catalog. It describes six types of drillheads. They are: fixed center, angular, rotating, double eccentric adjustable, single eccentric adjustable and universal joint adjustable. (Thriftmaster Products Corp.)

For free copy circle No. 3 on postcard

Plastic Valves

Describing plastic valves and fittings, a 16-page folder presents in detail the various company products in corrosion-resistant polyvinyl chloride. (Walworth Co.)

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Gear Shaving Machine

Described and illustrated in a bulletin are principal elements, operating principles, cutter head and table for a rotary gear shaving machine. Specifications and capacity tables are included in the four-page bulletin. (National Broach & Machine Co.)

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Metal Forming

An explanation of hot extrusion and die forging, and their advantages, are part of an informative brochure. Also listed in the literature are special metals and alloys that the company is capable of extruding or die forging. (Janney Cylinder Co.)

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Circular Chain

Designed to operate on curves, a roller chain is described in a brief bulletin. The chain acts as a transfer medium from one straight-line conveyor to another. Details and engineering data on the chain are also supplied. (Acme Chain Corp.)

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Hand Tools

Highly-specialized hand tools, to cope with unusual assembly and service problems, are featured in an illustrated bulletin. The bulletin suggests ways to minimize the cost of designing and producing special purpose tools. (Xcelite, Inc.)

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Die Assembler

A two-page bulletin describes a die assembler. It is designed to take the work and risk out of handling dies during assembly or maintenance. (The Producto Machine Co.)

For free copy circle No. 9 on postcard

Chromallizing

The effects of chromallizing superalloy gas turbine vanes are detailed in a four-page, illustrated technical article. Chromallizing is a metal diffusion process which protects the vanes against damage from high operating temperatures.

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FREE LITERATURE

Photos compare chromallized and unchromallized microstructure cross-sections of a nickel-base superalloy. (Chromalloy Corp.)
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Chipless Machining

An eight-page bulletin describes and illustrates a process of chipless machining for cold-forming splines, serrations, grooves, threads and similar forms. Detailed illustrations show the operation and the type work performed. Illustrated are ways of obtaining increased output, material savings, finer surface finish and stronger parts. (Michigan Tool Co.)
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Heating Elements

A four-page bulletin describes and illustrates radiant plate directed heat elements. The booklet discusses the many advantages obtained in using radiant plate elements in high-temperature furnace design and construction. (Pacific Scientific Co.)
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Jet Cleaner

Information on the installation, operation and maintenance of a hydraulic jet cleaner, is contained in a four-page bulletin. A line drawing shows a typical unit installed, in relationship to supply lines and a detergent tank. (Sellers Injector Corp.)
For free copy circle No. 13 on postcard

Dust Control

A product bulletin describes a complete line of dust-control equipment. It discusses the four main types of dust control products—dry centrifugals, wet collectors, fabric collectors and electrostatic precipitators. The bulletin explains and illustrates thirteen different company products, their capacities, and their specific applications. (American Air Filter Co., Inc.)
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Fabricating Aluminum

Much up-dated technical information, helpful to any man concerned with the every day problems of buying and fabricating aluminum, is offered in a catalog. It has numerous easy-to-follow tables of physical properties, mechanical properties, mechanical property limits and other information. (Adam Metal Supply)
For free copy circle No. 15 on postcard

Sight Glasses

Property data and installation information on Pyrex brand and Vycor brand sight glasses are contained in a bulletin. Sight glasses are used in such places as ovens, absorption columns, reaction kettles, furnaces and processing tanks. (Corning Glass Works)
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Batch Cleaning

Consisting of 12-pages, an illustrated booklet discusses industrial batch cleaning in some detail. It cites the efficiency of different methods and their effectiveness on parts that range in size from the smallest pieces to the great blocks of locomotive diesel engines. (Magnus Chemical Co.)
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Flame Hardening

Flame-hardening equipment is the subject matter of a 12-page brochure. Clearly illustrated and diagramed, the brochure discusses the various problems of oxyacetylene flame hardening. It shows how these problems can be solved with the manufacturer's equipment. (Air Reduction Sales Co.)
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Stacker Cranes

Various applications of stacker cranes, in the warehousing of steel bar stock, dies, rolls of cellophane and aluminum foil, drums and pallets, are described in a 12-page bulletin. (The American Monorail Co.)
For free copy circle No. 19 on postcard

Threading Tools

Threading tools are described and illustrated in a 44-page bulletin. The brochure covers the self-opening threading and hollow milling heads, collapsible and solid adjustable taps. Also covered are specifications, parts lists, ordering instructions and thread data. (National Acme Co.)
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Magnetic Separators

Detailed information on magnetic coolant separators is given in an eight-page catalog. (Barnes Drill Co.)
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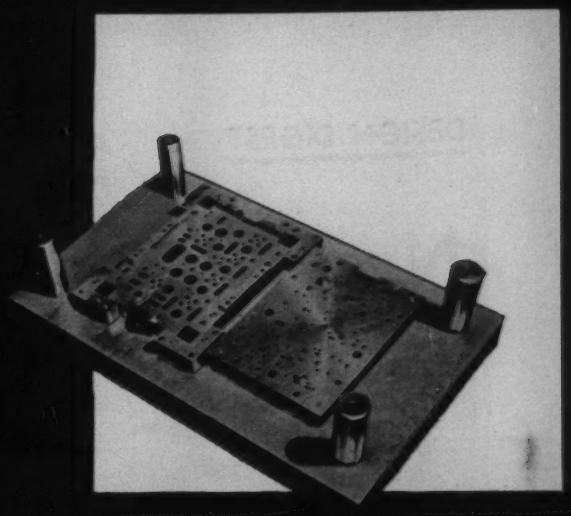

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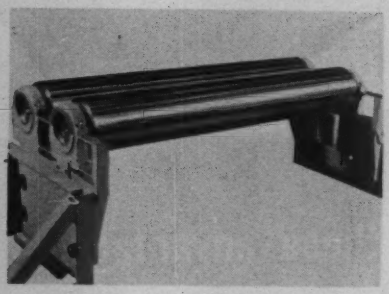
The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

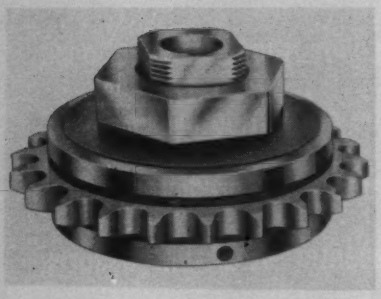
New Materials and Components



Unit Measures Strip Tension in Cold Rolling Mills

Applicable to mills of any width, an indicating and regulating tensiometer measures strip tension over a wide range. Strip speeds may be as high as 8000 fpm. When used with tension regulating circuits, its output is suitable as a feedback signal for direct regulation of desired rolling tension. Rotation of the tension measuring rolls measures tension. Maximum deformation of the tensiometer is only 0.002 in. from minimum to maximum tension. Small tension roll deflection provides good mechanical accuracy. (Allis-Chalmers Mfg. Co.)

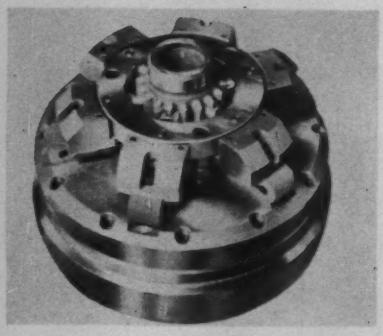
For more data circle No. 25 on postcard, p. 175



Overload Safety Device Eliminates Breakdowns

A needle bearing safety device is made of carbon steel. The device does away with the costly breakdowns due to overloading. It is intended for use in conveyors, presses, material - handling machines, construction equipment, and other equipment with power transmissions. The overload safety device has a minimum of parts. It is lubricated for life. The clutch facing resists moisture expansion and allows more constant torque. The device also features induction-hardened bearing race; easy installation and adjustable torque adjusting nut. (Dalton Gear Co.)

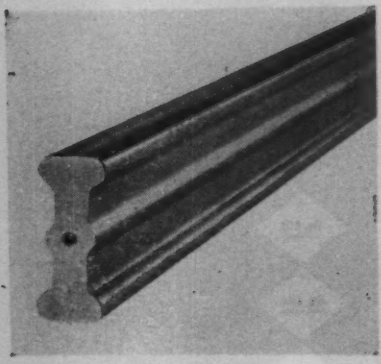
For more data circle No. 26 on postcard, p. 175



Spring-Jaw Gear Chucks Hold Part Accurately

With automatically self-compensating spring jaws, gear chuck jaws operate independently. In this way, they give accurate location from all segments. They do this even though an out-of-round condition might have been caused during prior heat-treating or machining. Averaging out the error in this manner improves quality of gears. They give quieter gear operation at no extra cost. The spring-jaw type gear chucks accurately hold the part from the pitch line of the gear. The chucks are air, drawbar or manually operated. They can handle a variety of gears by changing only the cage and locating pins. (Erickson Tool Co.)

For more data circle No. 27 on postcard, p. 175



T-Bone Anode Design Offers More Anode Area

With its concave center and convex edges, a T-bone anode offers about 40-pct more anode area. There is no increase in weight. The extra area is more evenly distributed in sections where heaviest erosion takes place. The T-bone anode generates an adhering brown film which eliminates the need for bagging. The nickel anode experiences a minimum of undissolved metallic particles and impurities. It erodes smoothly without shredding or flaking. The new anode also eliminates spear formation and "necking." It permits higher current density without burning. The ribbed section protects drilled and tapped area in all anodes. Its design facilitates handling and stacking. (Univertical Corp.)

For more data circle No. 28 on postcard, p. 175

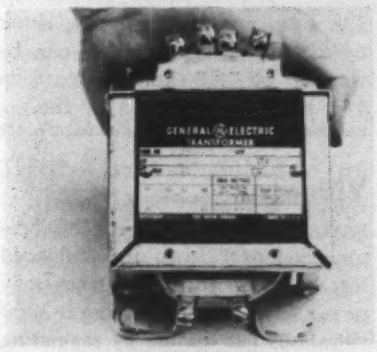
Small Transducer

Drastically reduced in size and weight, a micro-miniature transducer features a flush diaphragm with high frequency response. Ranges are 0-10 psia to 0-100 psia. Size is 0.590-in. diam by 0.050-in. thick. (Statham Instruments, Inc.)

For more data circle No. 29 on postcard, p. 175

Machine Transformer

An optional terminal arrangement is offered on machine tool transformers. The terminal arrangement is constructed with the terminals on the transformer coil instead of leads out of the transformer.



They are designed for use in electrical machinery and control panels. They come in a range of ratings from 50 volt-amp through 5 kva. (General Electric Co.)

For more data circle No. 30 on postcard, p. 175

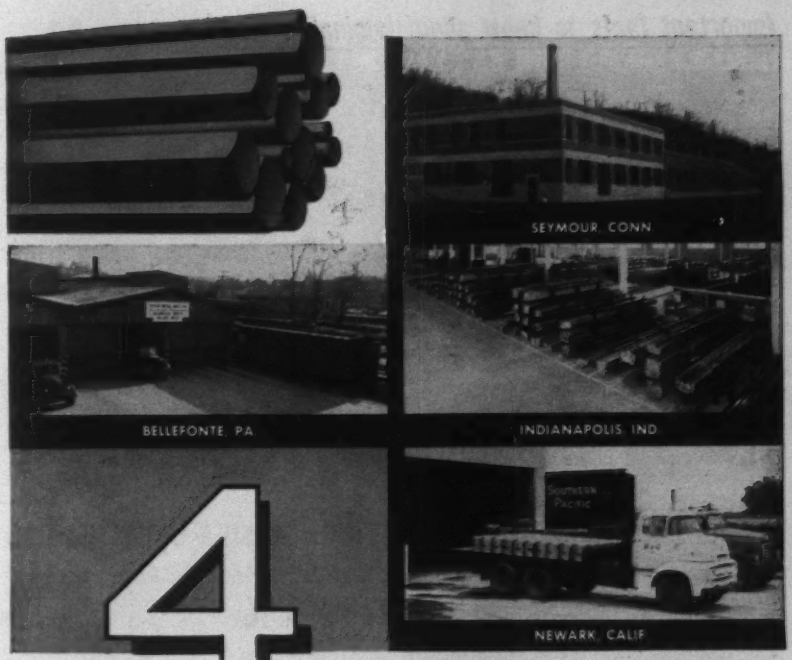
Supports Loads

For use under the supporting points of high-precision machine tools, a mount supports loads up to 30,000 pounds per mount. It maintains absolute level within 0.00005 in. per foot, while isolating the machine from floor borne vibration on a column of air. (Barry Controls Inc.)

For more data circle No. 31 on postcard, p. 175

Improved Strength

A metallurgical compound reduces grain size and increases structural strength in aluminum and aluminum-alloy castings. The compound enhances the feeding properties of the melt. It also increases resistance to hot tearing in the



4 Titan Brass Mill Depots give OVERNIGHT DELIVERY to most users!

Titan is located coast-to-coast for serving the daily requirements of warehousers, distributors, and users of brass rods. If you are within 400 miles of Titan's Northeastern, Eastern, Mid-western or Western mill depots, you can have overnight delivery on quality Titan brass.

Titan carries in stock 3,000,000 pounds of Free-Cutting Brass rounds (⅛" to 12"), hexagons (⅛" to 4½"), rectangles and squares, half-rounds, half-ovals, angles and octagons; Naval Brass, Free-Cutting Commercial Bronze, and Leaded Nickel Silver rods.

Free-Cutting Rod sizes over ⅛" to 2¼" are chamfered on both ends and are in uniform 12 ft. lengths for faster and more economical operation of automatic screw machines.

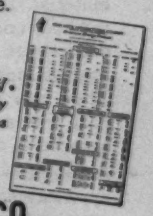
Special Titan tempers and modified free-cutting brass alloys are designed for machining in conjunction with severe knurling, deep thread rolling, deep roll stenciling, spinning, staking, flattening, bending, or flaring and expanding.

Titan depot facilities also allow quick delivery on orders of Titan brass, copper and aluminum forgings, bronze welding rods, brass wire, brass pressure die castings.

May we say more? Call Titan's nearest office, distributor or depot for outstanding brass service.

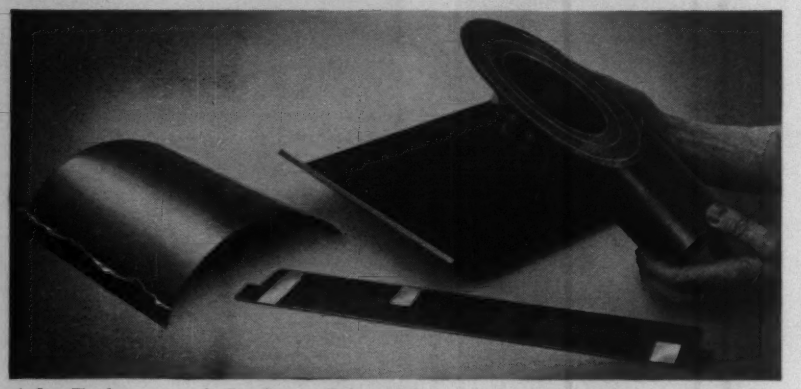
45 YEARS OF QUALITY BRASS

Write us on your letterhead if you wish to receive the weekly stock list of the Titan Brass Mill Depot in your area.



Titan® METAL MANUFACTURING CO.
DIVISION OF CERRO DE PASCO CORPORATION
Bellefonte, Pa. • Newark, Calif. • Offices and Agencies in Principal Cities

Important facts to know about laminated plastics



A few Taylor composite laminates (left to right): copper-clad section; sandwiched copper component; Taylorite vulcanized fibre-clad part; laminated tube, copper inserts.

Composite Laminates Open Up New Design Opportunities

While the great variety of commercially available laminated plastics satisfy most electrical and mechanical requirements, there are applications that can benefit from the combination of properties provided by composite laminates. Recent advances in bonding techniques have made it possible to bond virtually any compatible material with a laminate. These can be supplied as clad or as sandwiched materials. And they can be molded into many shapes to fit design requirements. Taylor is presently supplying to order the following composite laminates:

- **Copper and laminated plastics.** Clad for printed circuits and formed shapes. Sandwiched for special applications.
- **Taylorite® vulcanized fibre-clad laminates.** These combine the high strength of laminated plastics with the superior hot-arc-resistance of vulcanized fibre. They are being used in both high and low-voltage switchgear applications. Also in applications where the high impact strength of vulcanized fibre may be advantageous.
- **Rubber-clad laminates.** Almost any type of natural or synthetic rubber may be used as the cladding material. These laminates are widely used for condenser tops in wet condensers to protect the laminate against highly alkaline electrolytes. They also have application in any part where sealing or chemical resistance is needed.
- **Asbestos-clad laminates.** For applications where high heat- and arc-resistance are required.
- **Laminate-clad lead.** Lead sheets sandwiched between Grade XX paper-base laminates have been used for X-ray shields. The laminate provides strength and contributes to the high shielding properties of the lead.
- **Aluminum-clad laminates.** These have been used extensively for engraving stock. They also offer possibilities as printed-circuit material and as plate holders for X-ray machines.
- **Beryllium copper-clad laminates.** Beryllium copper is nonmagnetic and a good conductor—properties that give these laminates possibilities in many applications.
- **Stainless steel-clad laminates.** Applications where nonmagnetic properties are required. Also in certain corrosive environments where the resistance of stainless steel to attack is an asset.
- **Magnesium-clad laminates.** These laminates have been produced in 108-in.-long sheets for use as screens for X-ray operators. Weight was a factor.

Our design and production engineers are constantly developing new materials, new applications, and new procedures for fabricating laminated plastics. Our experience is yours for the asking. And if you have a problem requiring assistance or more information on composite laminates, write us. Also ask for your copy of Taylor's new guide to simplified selection of laminated plastics. Taylor Fibre Co., Norristown 52, Pa.

Taylor
LAMINATED PLASTICS VULCANIZED FIBRE

casting and reduces or eliminates homogenizing. The product insures a surface free from defects and minimizes cracking during subsequent working. (Foundry Services, Inc.)

For more data circle No. 32 on postcard, p. 175

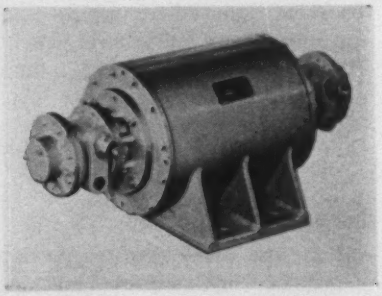
Solid Film Lubricant

Designed for metal spinning, die stamping and forming, tube bending and wire drawing, a solid film lubricant greatly reduces damage and wear to parts and dies. Its low coefficient of friction also allows smaller radius bends on tubing. The lubricant applies easily, either by dipping or spraying. It can be washed off the finished part in 140°F water. (Electrofilm, Inc.)

For more data circle No. 33 on postcard, p. 175

Vibrator

Weighing 231 lb, a super vibrator develops 12 tons of unbalanced force at 3000 rpm. Frequency may be steplessly controlled from 0-3000 vibrations per minute by regulating



the flow of air or oil. Used for large chutes and bunkers, the unit must be fastened securely to the heaviest of structural members to be effective. (Martin Engineering Co.)

For more data circle No. 34 on postcard, p. 175

Improved Carboloy

Higher quality and hardness and greater wear resistance are the characteristics of an improved carboloy grade. The new material does a better job at less cost on many of the ordinary steel cutting operations. The improved carboloy grade comes in a full line of utility and precision pre-honed disposable

inserts and brazed tooling. Inserts are factory pre-honed for faster cutting and longer tool life. The line also includes most standard blanks from 0000 to 7000 styles. (General Electric Co.)

For more data circle No. 35 on postcard, p. 175

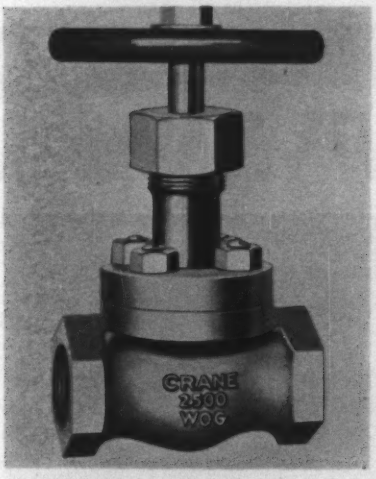
Corrosion Protection

For protection against corrosion, a compound applies a chromate film to aluminum surfaces. The compound conforms to MIL-C-5541 specifications covering immersion coatings. It may be used as a base for paint coatings or for decorative purposes. The protective chromate films develop from a chemical reaction between the aluminum surfaces and the solution. (The Diversey Corp.)

For more data circle No. 36 on postcard, p. 175

Globe and Check Valves

A line of 2500-lb hydraulic, bronze globe and check valves has working pressures of 2500 psi cold water, oil, or gas. Other features include a 45° seat (flat to flat). The



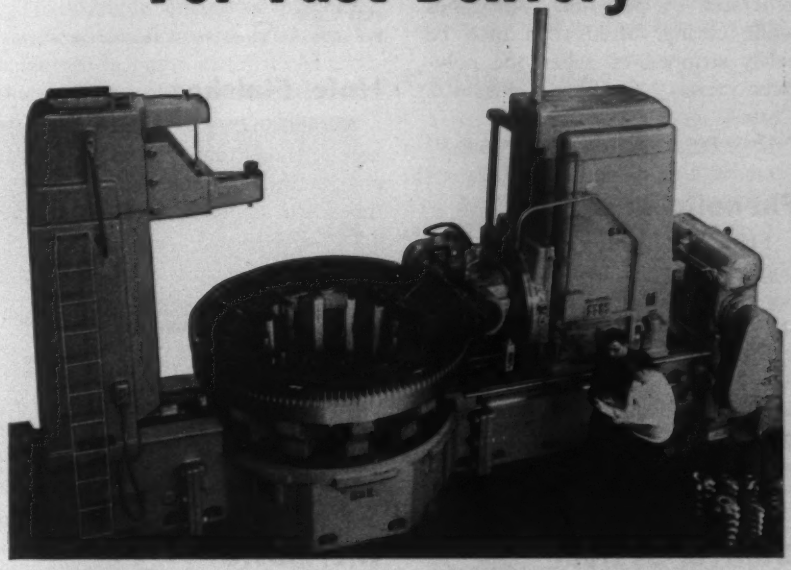
1½- and 2-inch globe valves are furnished with bolted bonnets with "O" ring gasket. They have handwheels instead of lever handles. (Crane Co.)

For more data circle No. 37 on postcard, p. 175

Molding Latex

A heat-resistant liquid latex is very good for making rubber molds to be used for casting polyester and epoxy resin compounds. The latex

New Production Capacity For Fast Delivery



Large Generated Gears

SPUR • HERRINGBONE • HELICAL

for a wide range of industrial applications

Gears which must operate smoothly and without vibration at higher speeds and under greater loads must correspondingly be more accurate in tooth profile and spacing.

H & S Generated Gears answer these demands.

Offering the same high-quality standards which characterize the complete H & S Gear line, production capacities for large generated Spur, Helical and Hobbed-Herringbone Gears are now available in the following dimensions:

Up to 80″ outside diameter at 1 DP
Up to 90″ outside diameter at 1¼ DP
Up to 100″ outside diameter at 1½ DP
Up to 125″ outside diameter at 2 DP
Face widths up to 42″, depending on helix angle

Send your specifications, or let our technical staff make recommendations. H & S specializes in fast production of quality industrial Gearing and Speed Reducers to meet your custom requirements.

Write for Catalog FLB-60

H S **The HORSBURGH & SCOTT CO.**

5112 Hamilton Avenue • Cleveland 14, Ohio

makes it possible to cast intricate parts from polyester in rubber molds. These molds will resist heat generated by polyester compounds while curing. Molds can then be easily stripped off when the polyester cures. (Adhesive Products Corp.)

For more data circle No. 38 on postcard, p. 175

Phenolic Laminate

Flame-retardant, a paper-base phenolic laminate comes either copper-clad or non-clad. It is rated as self-extinguishing with "0" in. burning distance. The laminate possesses good electrical properties, fine dimensional stability and good punching qualities. (The Richardson Co.)

For more data circle No. 39 on postcard, p. 175

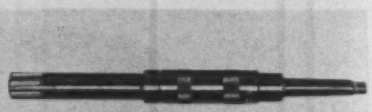
Control System

A small electronic control system provides all of the required instrumentation to measure and control a furnace. The system offers maximum flexibility in operation. It also provides for integrating data-handling and computing equipment. All of the components consist of modern plug-in units. (Leeds & Northrup Co.)

For more data circle No. 40 on postcard, p. 175

Hole Finisher

Minimizing part preparation, a hole finishing tool improves surface characteristics by as much as 100 times. During the process, the metal



flows out ahead of the tool, filling the valleys and leveling the peaks. (Cogsdill Tool Products, Inc.)

For more data circle No. 41 on postcard, p. 175

Thermostat

For liquid immersion, a switch is mounted in a special stainless steel well. It can be removed, if desired, from the well without disturbing the fluid. Top temperature of the switch is 700°F. The switch is hermetically sealed. Lead wires do not enter the case. (Scaico Controls, Inc.)

For more data circle No. 42 on postcard, p. 175

Relief Valve

With a polyvinyl chloride body, a relief valve can handle corrosive fluids. The valve exhibits good resistance to corrosive attack by acids, alkalis, salt solution, alcohol and other chemicals. Produced in sizes to 2 in., the valve can be used at temperatures to about 160°F; adjustable pressures to 120 psi. Reduced pressure ranges are 5-15, 10-80, and 50-120 psi. The valve modulates in response to the upstream pressure. (Atlas Valve Co.)

For more data circle No. 43 on postcard, p. 175

Nickel Stripper

Ready-to-use, a stripper for nickel and other metals is a free-flowing, readily soluble powder. It needs only to be added to water at

EXECUTIVE REPORT #11

HERE CARBON STEEL SHEDS ITS SCALE

Wheelabrator® Descaling Enables 100% Increase in Production

Every ton of steel produced in the modern mill of Altos-Hornos De Mexico, S.A., at Monclova, Coahila, is run through a Wheelabrator airless blast descaling cabinet. In a typical month, over 15,500 tons of carbon steel from a hot Steckle reversing type mill was Wheelabrator descaled followed by a light pickle rinse. The end product is reduced on reversing cold mills for sale as cold rolled steel, tin plate, and galvanized stock.

Steel is descaled in this new line at a rate of up to 200 f.p.m. contrasted to a speed of only 100 f.p.m. when acid pickling was used exclusively for descaling. Even with this increase in production, acid consumption has been cut in half and overall descaling costs materially reduced.

Wheelabrator Engineering Experience At Your Service

Write today for information on how Wheelabrator descaling can cut your costs and speed production. Wheelabrator Corporation, 510 S. Byrkit St., Mishawaka, Indiana. In Canada, P.O. Box 490, Scarborough, Ontario.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

room temperature to make a solution which will strip nickel from steel. The nickel plate is chemically dissolved. No electric current is required. The stripper also strips copper, brass, cadmium, zinc and silver from steel, most iron alloys and magnesium. It does this without attack of the basic metal. (Enthone, Inc.)

For more data circle No. 44 on postcard, p. 175

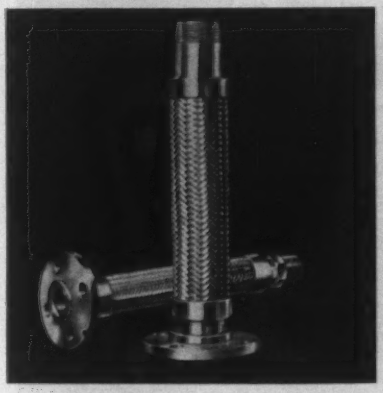
Transmitting Unit

A pneumatic, transmitting bellows flow meter has unusual temperature stability. Using modular construction, the units come in both indicating and non-indicating models. They feature a flapper nozzle pneumatic circuit; and a pilot valve with controlled bleed for stability. Each major component of the transmitter can be independently removed. The unit provides two-way overload protection, while the flow meter itself can take full static pressure overload in either direction. The bellows-type meter measures flow; also liquid level in closed tanks under pressure or vacuum. (Brown Instruments)

For more data circle No. 45 on postcard, p. 175

Flexible Connectors

Troublesome effects of pipeline vibration, misalignment, or thermal expansion in pump installations are absorbed or reduced by flexible



pump connectors. Consisting of a short section of corrugated flexible metal tubing, these pump connectors are furnished with threaded or flanged end connections to fit all standard piping sizes. The connectors are individually engineered to the specific application for optimum results. The pump connectors handle pressures to 1500 psig, depending on alloy, braid construction and size. (Allied Metal Hose Co.)

For more data circle No. 46 on postcard, p. 175

Crane Scale

Housed in the crane hook unit, a crane scale weighs individual loads as they are lifted by a crane. The load-cell type weight sensing device easily adapts to the various types of cranes. The system provides visual numerical indication of load weights. It will also record load weights on a local printer and a remote printer if desired. In addition, the system accumulates weight totals and prints sub-totals and totals. (George Kelk, Ltd.)

For more data circle No. 47 on postcard, p. 175

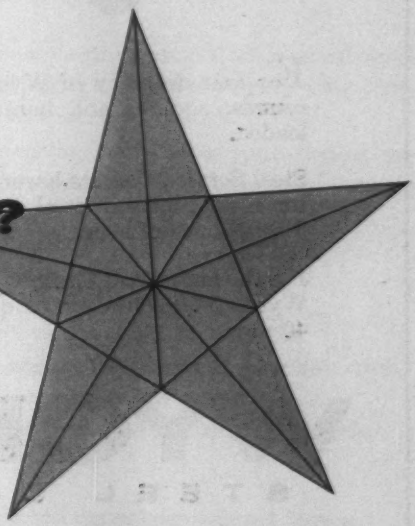
Air Cylinders

One-in. bore air cylinders are designed for high-speed assembly machines and other heavy-duty uses in

EXECUTIVE REPORT #16

HOW MANY TRIANGLES* CAN YOU FIND IN THIS STAR?

Look for the hidden value in blast cleaning abrasives, too



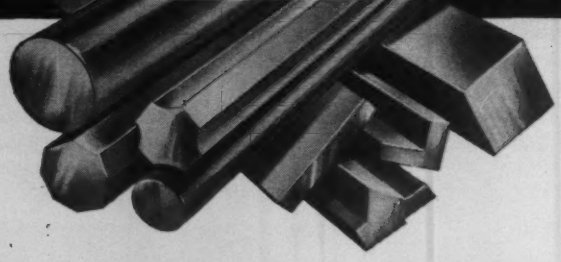
The "hidden values" you get in a high quality steel abrasive, like Wheelabrator Steel Shot, far outweigh any price advantage of the so-called "economy" abrasives. Wheelabrator Steel Shot is harder and tougher — lives for many more cycles through your blast equipment. It cleans better — allows shorter blast cycles. You'll get better, faster cleaning, lower maintenance, lower actual cleaning costs with top quality Wheelabrator Steel Shot. Thousands of users do. Your Wheelabrator Abrasive Engineer will prove it.

Write today for this new handbook of blast cleaning abrasive performance, full of charts and facts to help you control abrasive consumption and reduce cleaning costs. Write to Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Ind. In Canada, Wheelabrator Corp., Canadian Div., P. O. Box 490, Scarborough, Ontario.

WHEELABRATOR
STEEL ABRASIVES

If you examine it closely enough, you'll find 97 triangles.

Call YOUR LOCAL
STEEL SERVICE CENTER



For fast delivery of Wyckoff cold drawn flats, rounds, squares and hexagons—carbon, alloy or leaded.

Steel Service Centers lower your cost of possession for Cold Finished Steel Bars in quantities under 6000 pounds of a size.

For the finest Cold Finished Products always specify Wyckoff—producers of quality steels for over 40 years.

WYCKOFF
STEEL COMPANY

GENERAL OFFICES: Gateway Center, Pittsburgh 30, Pa.
Branch Offices in Principal Cities
Works: Ambridge, Pa., Chicago, Ill., Newark, N.J., Putnam, Conn.

DESIGN DIGEST

small space. The cylinders employ Teflon rod seal-wiper combinations and piston seals. These help eliminate awkward maintenance under cramped quarters. The cylinders are rated at 200 psi. They come in eight standard strokes, ranging from ½-5 in. (Hydro-Line Mfg. Co.)

For more data circle No. 48 on postcard, p. 175

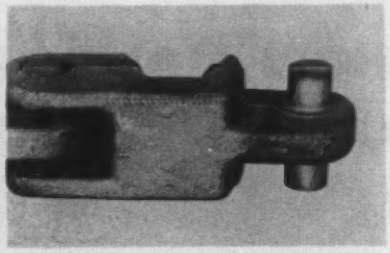
Water Circulator

A high-head, sealless water circulator combines motor and pump in a single leakproof unit. The "canned" unit incorporates rubber flanges for quiet operation. It installs in any position. It can handle up to 190,000 Btu an hour in systems with a 20° temperature drop. The unit circulates up to 23 gpm and produces a head of 25 ft at shutoff. It is suitable for pressures to 30 psi and temperatures to 220°F. (Fostoria Corp.)

For more data circle No. 49 on postcard, p. 175

Conveyor Chain Link

For conveyor systems, a new design chain link greatly increases the chain's life and strength. In the new chain link, the pin is made of



the same alloy steel as the link itself. It's forged right into the link. (Kropp Forge Co.)

For more data circle No. 50 on postcard, p. 175

Compressed Air Filters

Featuring coalescent action, a line of compressed air filters removes almost 100 pct of the entrained dirt, oil and water from the air. The filters are for use with pneumatic instruments and controls, vacuum pumps and air-operated equipment of all kinds. Maximum flow rates range from 20-200 standard cu ft per minute. Pipe

sizes range from ¼-2 in. Coalescent action gives the air a scrub-and-polish treatment. (King Engineering Co.)

For more data circle No. 51 on postcard, p. 175

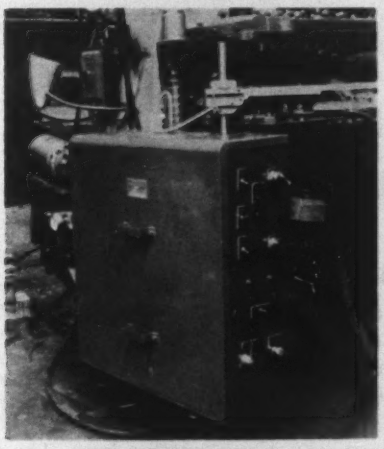
Power Supply

Highly advanced, a solid-state power supply provides all necessary voltages for operating a computer system complex. The computer supply system is flexible. It may contain from six to 32 regulated dc supplies. These supplies can be integrated with a common control system so as to effect a reduction in total number of parts. Consequently, a reduction in space and weight in the overall system is accomplished. (Magnetic Amplifiers Div., The Siegler Corp.)

For more data circle No. 52 on postcard, p. 175

Press Feeder

Electrically driven, a press feeder for single pieces, attaches to any punch press. Workpieces are carried to the die by suction cups, magnetic or mechanic pick up at a continuously adjustable rate from 0-3600 per hour. The unit features: complete safety for the operator with increase in production; very



simple change-over from one workpiece to another; maximum weight of workpiece up to 5 lb; accurate transfer of parts. Provision is made for use of an "electric eye" to stop the press automatically, if the part has not been ejected from the die. (Special Machinery Co.)

For more data circle No. 53 on postcard, p. 175

Far Ahead in Design and Efficiency

"YOUNGSTOWN"

CONTOUR ROLL LATHES

Automatic

"templet or numerically controlled" hydraulic or electric tracers assure fine finish and precision operation

Designed for a single purpose—roll turning. Choice of turning rolls in housings on the roll necks or using the heavy duty live centers provided in the headstock and tailstock.

"YOUNGSTOWN" engineering anticipates your future, as well as present productive position, in this quality line of Contour Roll Lathes.

PROVEN PERFORMANCE FEATURES:

- Heavy Duty roll lathe *rigidity*—with the *versatility* of the engine lathe
- Use of carbide, or ceramic tools provided by wide RPM range of headstock speeds
- 3-way bed for rigidity, with hardened and replaceable wear plates
- Anti-Friction Ball screws and nuts for longitudinal travel of carriage and cross-slide insuring precision tracing
- Operator travels with the work
- Heavy-Duty spring-loaded tail stock with load indicator—safeguards bearings
- Headstock has illuminated inspection ports, automatic lubrication, Timken roller bearings
- Housings—manually or hydraulically operated
- Electric-Hydraulic Ragging attachment optional
- Heavy Duty mill type construction. Herringbone gearing throughout.
- Faceplate overhang eliminated.

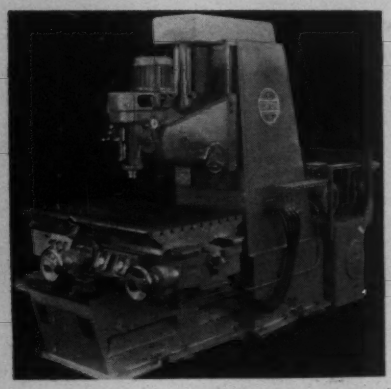
Write us to arrange a demonstration.

The Youngstown Foundry & Machine Co.

Serving Industry Since 1885

Youngstown 1, Ohio

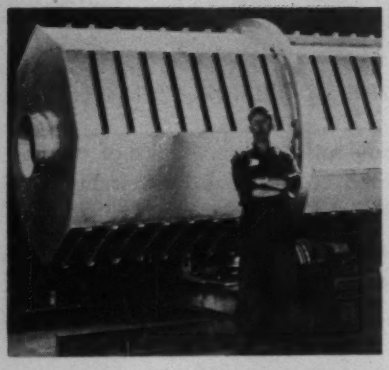
New Equipment and Machinery



Jig Boring/Milling Machine Operates Precisely

The large capacity and versatility of a jig boring/milling type machine facilitate the milling of flanges and bosses on large cast members. The precision drilling and boring capabilities materially reduce the time required to produce prototype parts, tooling plates and templates. The machine features a 36- x 54-in. table capacity. The machine is designed for precision drilling and boring operations and box-cycle milling. The unit can locate holes in plates within ± 0.0005 in. limits. The spindle of the machine provides 20 speeds from 40-5600 rpm. Cross and vertical slide-ways are Meehanite castings. The vertical slide is positioned by manual handwheel. A slide lock is provided for fixed milling and boring operations. (George Gorton Machine Co.)

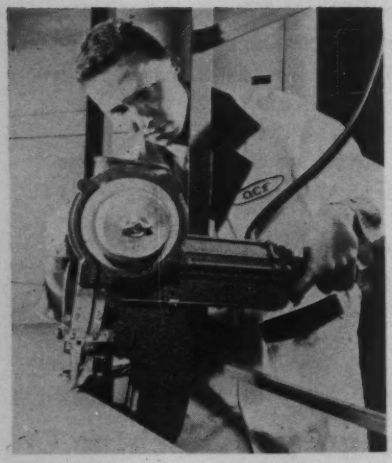
For more data circle No. 60 on postcard, p. 175



Rotating Drum Cooler Cools Materials Rapidly

A conduction-type drum cooler handles materials at high temperatures and cools them rapidly. The unit is a rotating drum with a series of flat, dual-purpose hollow fins or "cells." They are lapped to form an Archimedes spiral around the inside of the shell. Although the surfaces of the welded cells form one continuous spiral, each cell is a separate heat exchanger. It has an opening on the outer periphery of the drum. As the drum revolves partly submerged in water, the material to be cooled is conveyed down its spiral length from one turn in the spiral to the next. Because of the large amount of conduction cooling surface incorporated in the design, a relatively short drum is required. (Link-Belt Co.)

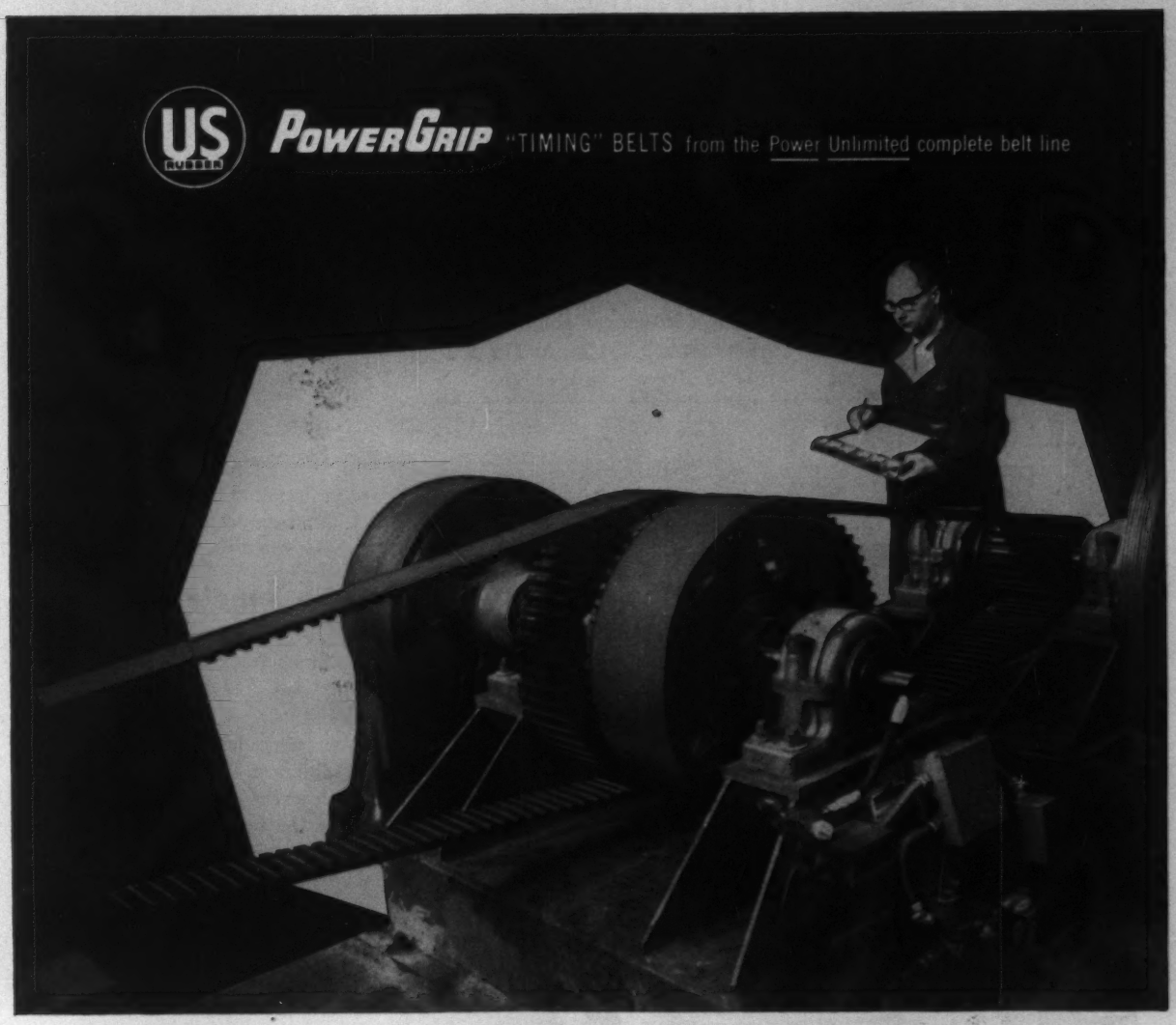
For more data circle No. 61 on postcard, p. 175

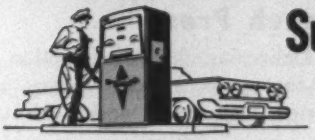


Portable Punch Riveter Reaches Out-of-Way Places

Weighing 50 lb, a portable punch riveter performs all operations automatically, in less than 2 seconds. This includes punching the hole, placing the rivet and heading. The riveter is a ⅛-in. machine. It is of the pneumatic squeeze type. A finger trigger and a handgrip controls the punching and riveting action. The riveter works this way: The workpiece is inserted in the jaws of the machine. Pulling the trigger punches and dimples a hole. A locating pin keeps the hole in alignment. Later it is pushed out by the rivet. A rivet is fed into the rivet shoe during punch stroke of piston. The rivet then drops from a pneumatically-driven rotating drum. The hand grip is turned slightly to the right. This actuates a detent that arms the device for heading operation. The trigger is pulled, placing and heading the rivet. The rivets may be either the flush- or round-head variety. (ACF Industries, Inc.)

For more data circle No. 62 on postcard, p. 175





Sun Oil Company obtains positive results with U.S. PowerGrip "Timing" Belts

The octane requirements for cars are determined by the Sun Oil Company with scientific accuracy. The octane ratings of motor fuels are in turn determined with precision. Nothing is left to chance. This is why the motorist can pull up at a Sunoco station and obtain the correct octane blend for his car.

All of this predetermination is done on precision equipment whose universal joint drive shaft is connected to a dynamometer by a 1¼" pitch U. S. Rubber PowerGrip "Timing"® Belt. In the words of a company scientist, these belts were selected because they give foolproof, positive drive transmission and do not require lubrication, maintenance or attention. Anything less would interfere with the precision of the testing equipment. This is the experience that has caused innumerable design engineers to specify PowerGrip.

This is the belt that has made possible the development and production of hundreds of appliances and equipment, ranging from sensitive electronic devices, office machinery, household equipment and gigantic production machinery. One way to get expert and instant power and transmission advice is from the U.S Distributor.

US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

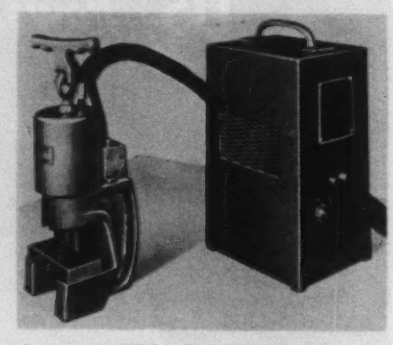
Chucking Machine

A spindle automatic chucking machine incorporates four new design features. They are: a universal cross slide, two longitudinal feeds, three individual spindle speeds and the ability to stop and position the spindles. Spindle speeds can be selected from a range of 150-1750 rpm. Cross slides have independently controllable stroke and feed. Longitudinal tool slides are arranged for one or two cutting strokes and for separate operations. (Baird Machine Co.)

For more data circle No. 63 on postcard, p. 175

Notches and Cuts Off

With capacities of 10, 20, and 30 tons, a series of notching presses handles maximum notching dimensions from 2 x 1 in. to 2½ x 2 in. in metal thicknesses up to ⅜ in. A ½-hp hydraulic power unit is standard. Both the power unit and the press can be hand carried to



the work. This does away with material-handling time and costs. (W. A. Whitney Mfg. Co.)

For more data circle No. 64 on postcard, p. 175

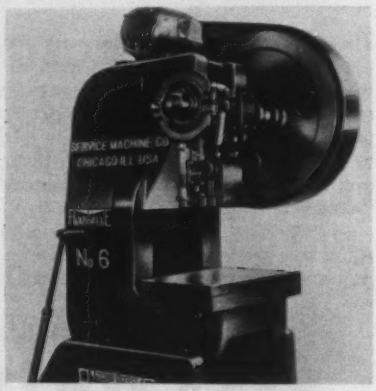
Tube Bending Machines

With regard to sizes, there are machines for tubes up to 1¼-in., 2-in. and 2¾-in. OD. Maximum wall thickness of all is 0.080 in. Some machines accommodate up to 12 different bending angles; up to 12 different straight tube legs between the bends; and up to 12 different turning angles. This permits successive bends in 12 different planes. Because of the combination of electrical and hydraulic devices, these machines are completely automatic. (Ernst Wachsmuth & Co.)

For more data circle No. 65 on postcard, p. 175

Punch Press

Delivering high production, a 60-ton press handles heavy and varied high-speed work with uni-

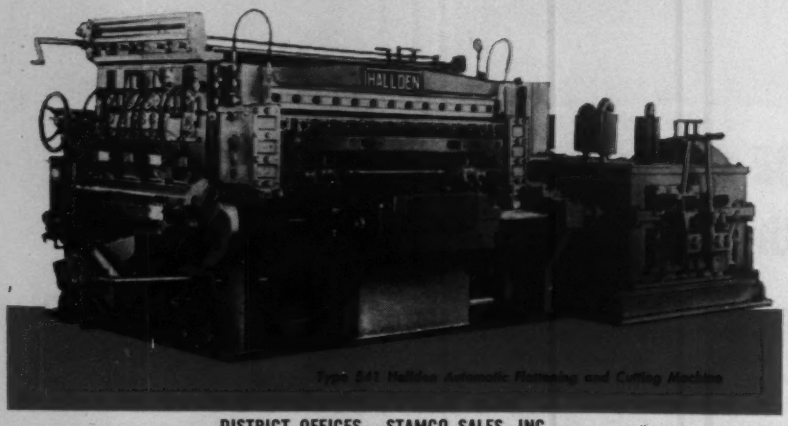


form accuracy. Its features include a choice of drives, clutches and controls. Heavy-duty design includes

Stamco

announces

the addition of HALLDEN equipment to their complete line of steel mill equipment. Hallden and Stamco, teamed together... available from one source for complete integrated planning.



Type 841 Hallden Automatic Flattening and Cutting Machine

DISTRICT OFFICES — STAMCO SALES, INC.

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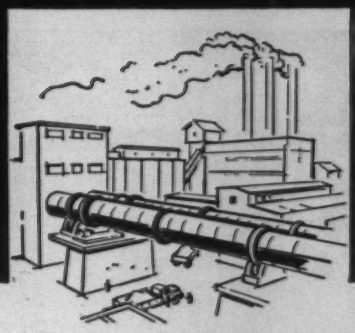
Slitting and Coiling Lines • Cut-To-Length Lines • Flying Shear Lines • Power Squaring Shears • Automatic Resquaring • Corrugating • Culvert • Steel Mill Equipment

Back of a Sack of Cement... This 4½ Ton Steel Forging



Give a thought to this the next time you drive a concrete highway or see a concrete block building. Only 8900 pounds of what it takes to make a sack of cement . . . a relatively small forged steel pinion shaft to drive cement mill machinery.

The large diameter is only 32 inches and the length only 8 feet—but it's a tough, dependable component of a vast manufacturing complex—the cement mill.

The smooth, bright finish is comparable to the gleaming surface of a 60 ton turbine rotor. Why? . . . Because the same careful metallurgical control, skillful engineering and precision production accorded the largest forgings we make are characteristic of this relatively small steel forging.

Place with us your simplest or most intricate forged steel components of any size or shape—you will like the results you get.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

an extra sturdy Meehanite frame; oversize crank bearings; double roller flywheel bearings and large inverted "V" ways. (Service Machine Co.)

For more data circle No. 66 on postcard, p. 175

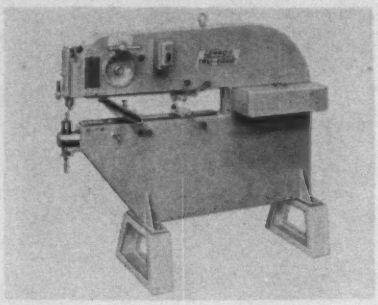
Thickness Tester

With microscopic accuracy, an instrument gages the thicknesses of coatings on iron and steel. The device provides a non-destructive means of measuring thicknesses of organic and non-magnetic metal coatings. To measure the thickness of a coating, a probe is simply applied to the surface. A closed magnetic field is created between the poles of the probe with the lines of force largely contained within the base metal. The thickness is accurately indicated on one of the direct-reading scales of the instrument. (Twin City Testing Corp.)

For more data circle No. 67 on postcard, p. 175

Shears, Forms, Pierces

Intermediate in size, a shearing, forming and piercing machine cuts in the center of 0.150-in. mild steel plate. It does this with no starting hole. The machine fits the needs of model shops, engineering labs and sheet-metal shops. It has an edge cutting capacity of 8 gage in mild

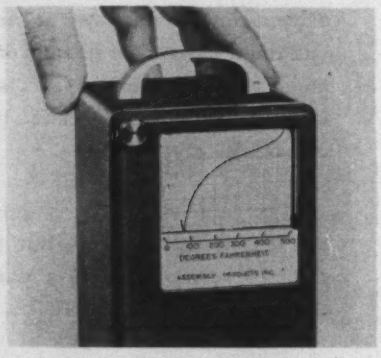


steel plate; 10-11 gage in stainless steel and 5 gage in copper. It cuts to either a scribed line or to a template. Throat depth is 42 in. This permits circle cutting up to 40 in. in diam inside the throat. (Lennox Industries, Inc.)

For more data circle No. 68 on postcard, p. 175

Temperature Recorder

Small in size, a temperature recorder operates directly from a thermocouple, without signal amplification. The meter movement is calibrated to match the thermocouple. The only electrical connec-



tions necessary for operation of the device are the thermocouple and a 115-v ac line. Minimum temperature span covered by the recorder is 0° to 500°F. Maximum span is 0° to 2500°F. Accuracy is ±2 pct

On Inert Gas Producers, also . . .

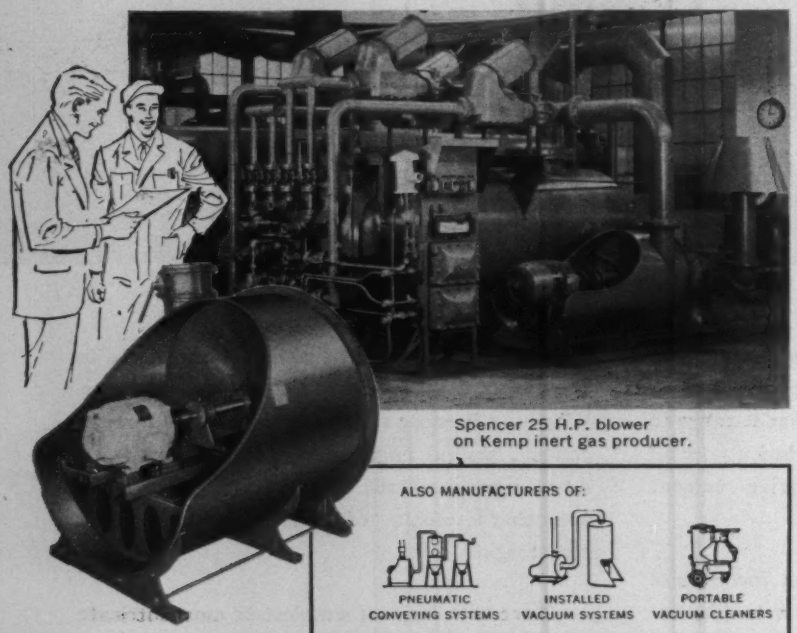
Reliable **SPENCER Blowers**

Another one of many critical applications where SPENCER blowers are preferred because of their:

NON-CONTAMINATION FEATURE—Delivery of clean air is assured. Absence of any internal lubrication (all bearings are outside of casing) means air cannot become contaminated.

COMPLETE DEPENDABILITY—Simplicity of design (lightweight impellers the only moving parts) and ruggedness of construction greatly lessen likelihood of service being needed. Proven performance promises uninterrupted service . . . thousands of Spencer blowers have been in operation for many years with no maintenance or repair required.

COMPACTNESS—Solidly constructed . . . with no unnecessary bulk.



Spencer 25 H.P. blower on Kemp inert gas producer.

ALSO MANUFACTURERS OF:

PNEUMATIC CONVEYING SYSTEMS

INSTALLED VACUUM SYSTEMS

PORTABLE VACUUM CLEANERS

Request Catalog #126B containing complete specifications on Spencer blowers, available in standard capacities of:
½ to 1,000 H.P.
Up to 20,000 C.F.M.
4 oz. to 10 lbs. pressure

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

DoALL tells how Lindberg equipment helps produce stainless steel gage blocks

For the DoALL Company, Des Plaines, Illinois, heat treatment of their Stainless Steel Gage Blocks was a most formidable problem. For lasting accuracy these blocks require extremely hard, wear-resistant surfaces, free from growth or shrinkage, as provided by nitrided stainless steel. Case depth must be controlled accurately and the core maintained at full toughness free of stresses. DoALL found the answer to this problem with a Lindberg Gas Fired Vertical Cyclone Tempering Furnace with a Nitriding Retort.

DoALL

Norman Silver, Chief Metallurgist, and Lindberg Vertical Tempering Furnace at DoALL Company.

NORMAN SILVER, Chief Metallurgist says, "Our Lindberg equipment supplies the uniformity of heat distribution and the fast accurate control that is needed for the exacting requirements of our product. The furnace responds to control almost instantaneously and maintains the temperature within plus or minus 5°. Its 38" diameter by 36" depth handles 200 to 300 pound loads for the desired production. Results obtained have satisfied us completely with this, the latest of our Lindberg furnaces".

Lindberg provides the most complete line of heat treating furnaces, fuel fired or electric, large or small, for every heat treating requirement. Your Lindberg Field Representative (see your local classified directory) will be glad to consult with you on your heat treating requirements or write us direct. Heat Treating Furnace Division, Lindberg Engineering Company, 2452 West Hubbard Street, Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, South Africa, Spain, Switzerland and West Germany.

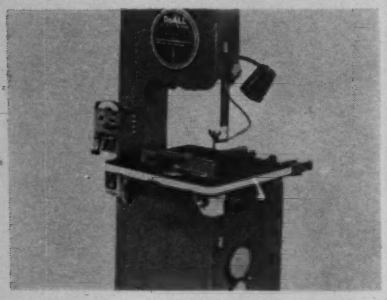
LINDBERG
heat for industry

of full scale. Standard chart speed is 1 inch per hour. (Assembly Products, Inc.)

For more data circle No. 69 on postcard, p. 175

Band Machine

Quick, straight and accurate are the cuts made by the glide table utility band machine. This machine brings the big machine advantages of a work feeding table to the low-cost utility line. This improves the ease and accuracy of the straight



cutting normally performed on these machines. It also adapts them for many fast, light-duty production jobs. The band machine has a 16-in. throat and 12-in. work height. (The DoAll Co.)

For more data circle No. 70 on postcard, p. 175

Projects Sharp Lines

A guide line light projects unusually sharp shadow lines to guide cutting, marking or assembling operations. The unit features a recently developed 1500-w bulb only ⅜ in. in diam. It will burn about 2000 hours without slightest loss of efficiency. A special reflector increases the lumen output. This makes possible the delivery of clear marking lines in a pattern 18- to 22-in. wide, with a useful length of 12 to 24 ft. The unit can project any desired number of parallel straight shadow lines, square or rectangles. (Carter Products Co., Inc.)

For more data circle No. 71 on postcard, p. 175

Rotative Distributor

For blast furnaces, a rotative distributor offers improved advantages. A non-rotative bell and a fixed bell seat give a positively tight joint, at low and high gas pressure. The receiving hopper, with its loose-fit bottom bell, is rotative. It is periodically operated in the regular manner. This arrangement provides the following advantages: avoidance of all packings; reduced power for the rotation and absence of delicate machinery parts exposed to dust and grit. (T. An. Tesch AB, Stockholm)

For more data circle No. 72 on postcard, p. 175

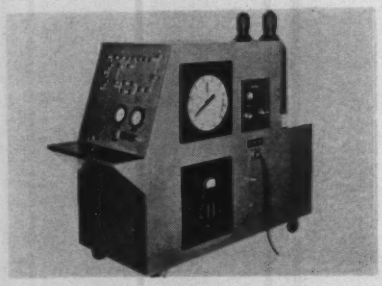
Finishing Machine

Hard-to-reach areas on aircraft, electronic, instrument and missile components can be cleaned, deburred or descaled with an automatic finishing machine. The high-production machine features stainless steel construction, pull-push controls, indicating lights and adjustable blast guns. (Automation Services, Inc.)

For more data circle No. 73 on postcard, p. 175

Gas Analyzer

Mounted on a portable wagon, a gas analyzer accurately monitors trace quantities of oxygen and water vapor in special gas atmospheres. Measurement of as little as 2 ppm

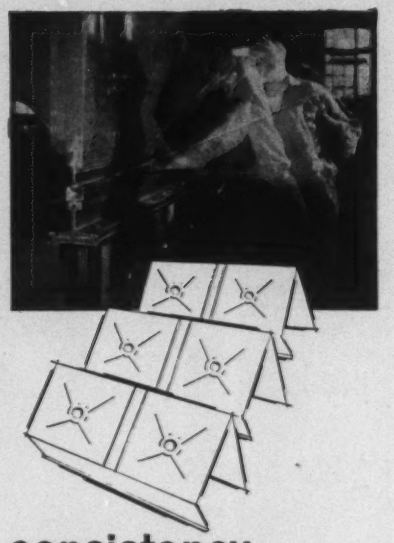


of oxygen and 1 ppm of moisture is possible in helium, nitrogen, argon, hydrogen or forming gases. Chart recorders provide permanent records. (Englehard Industries, Inc.)

For more data circle No. 74 on postcard, p. 175

Portable Gantry

For loads up to 30 tons, a portable self-raising gantry is made up of two A-frame legs, a crossbeam, fixed wheels or casters and the hoisting mechanism. Clear spans range from 9-16 ft. Headroom is from 10-20 ft. The gantry is suitable for hand block and tackle or electric hoisting gear. The A-frame legs are adjustable to give the



consistency...

Consistent, *predictable,* results throughout production processes must begin with the consistent quality of materials. J & L consistent quality stainless steel will give predictable results time after time...order after order.

The service offered by your J & L stainless steel distributor is consistent... and predictable, too. He's as near as your telephone. You'll find that he can further reduce the cost of using stainless steel by providing a complete selection of materials. He can save you the capital investment required to maintain long term inventories. He can provide a wide variety of preproduction services, and reduce your overhead for stocking, handling, accounting and obsolescence.

Your J & L distributor can provide you with the consistent quality stainless steel you need, *as you need it, when you need it.* He can serve you better because *J & L serves him better.* J & L's own staff of technical specialists and metallurgists are at the call of your J & L distributor to give you the technical assistance, even advanced research, you may need.

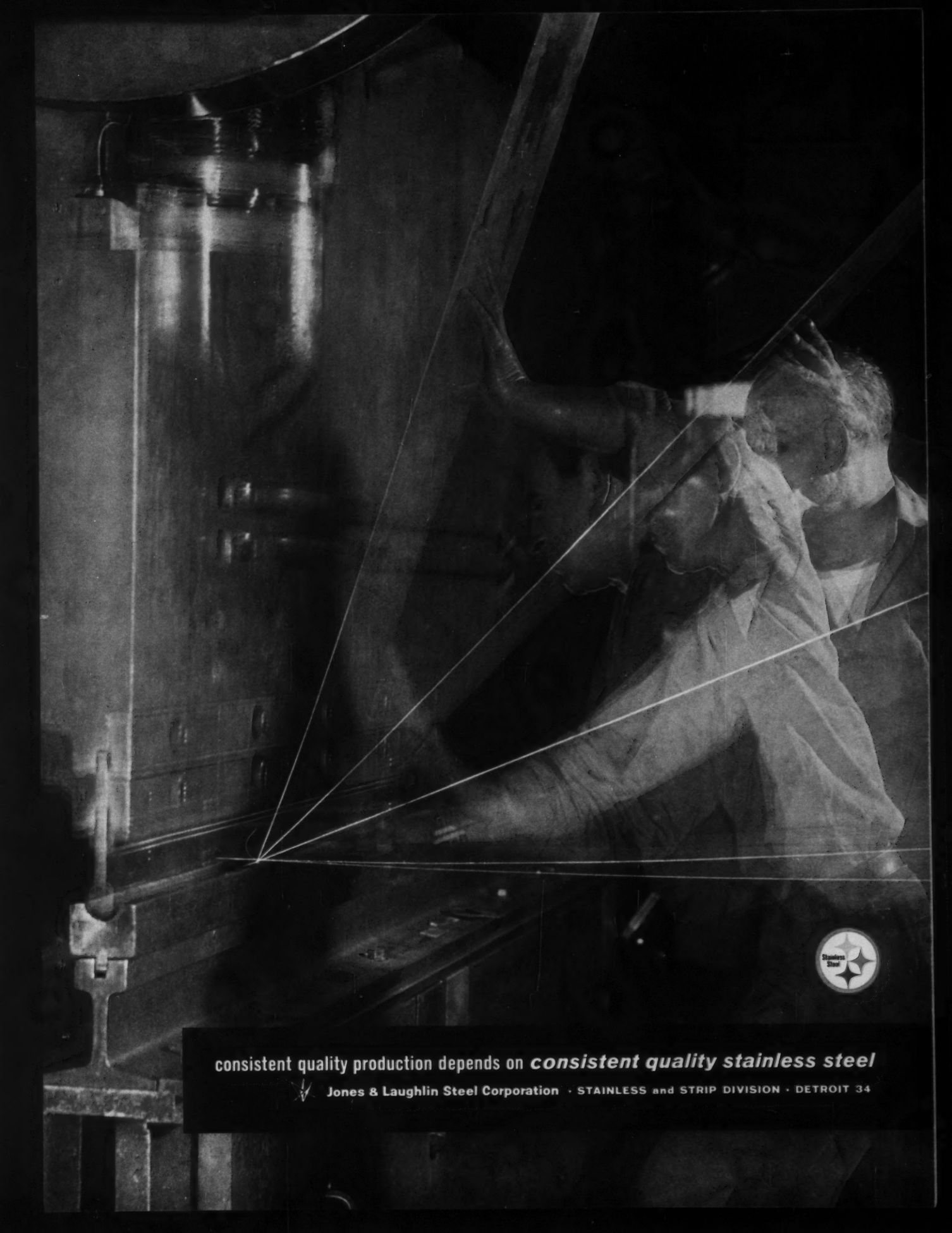
For better production and better service, call your J & L distributor—call Western Union Operator 25, today.

J&L—a leading producer of stainless steel and precision cold rolled strip steels

J&L

STAINLESS

SHEET • STRIP • BAR • WIRE


consistent quality production depends on consistent quality stainless steel
Jones & Laughlin Steel Corporation · STAINLESS and STRIP DIVISION · DETROIT 34

THE TRS MAN TOOK AN INSIDE LOOK

to save Carling 50% on a toggle-switch part

Carling Electric already used two TRS rivets to assemble snap-acting toggle switches, had no fastening problems for that product. But a stamped brass cap, in the top of each switch spring, kept costs up . . . springs had to be ground flat to seat the cap securely, and costs of brass strip stock, parts inventory, and tool maintenance were high.

Trained in the PAR Process approach to cost reduction, the TRS man saw a way out . . . suggested a dimpled *rivet* in place of the cap, worked out details with Carling engineers. This simple change eliminated spring grinding, stamping tool maintenance, brass strip stock and finished caps inventory. The dimpled rivets improved reliability and smoothness of toggle action, and dependable TRS deliveries removed any need for stocking them ahead of demand. Result: Carling scrapped existing parts inventory, converted to the new design at once.

FIND OUT what the Par Process can save you

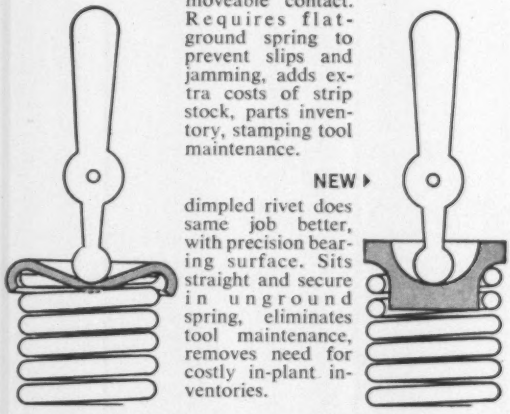
The PAR Process aims at lower costs and higher production rates. It starts with a sharp-eyed, production line search by your TRS man, for ways to eliminate or simplify and speed up steps in the assembly — using procedures specially organized by TRS, benefiting from unique TRS developments in rivets and riveting machines.

PAR may bring you better integration and fuller automation of assembly operations, or even a cost-cutting change in design as with Carling. Ask for a check of your operations. Whether your assembly jobs are simple or complex, it can be worth dollars to you.

THE CHANGE THE TRS MAN SUGGESTED

▼ **OLD** stamped cap transmits toggle motion through spring to moveable contact. Requires flat-ground spring to prevent slips and jamming, adds extra costs of strip stock, parts inventory, stamping tool maintenance.

NEW ▶ dimpled rivet does same job better, with precision bearing surface. Sits straight and secure in unground spring, eliminates tool maintenance, removes need for costly in-plant inventories.



Don't Buy Riveting Machines until you learn how the TRS **PAR** *process revolutionizes riveting*

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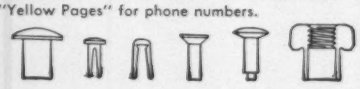
TUBULAR RIVET & STUD COMPANY

QUINCY 70, MASSACHUSETTS • **TRS** SALES OFFICES: Atlanta • Buffalo • Charlotte • Chicago Cleveland • Dallas • Detroit • Hartford • Indianapolis • Los Angeles • New York Philadelphia • Pittsfield • Quincy • St. Louis • Seattle. WAREHOUSE IN CHICAGO

See "Yellow Pages" for phone numbers.

If it's a Tubular Rivet TRS makes it . . . and Better



gantry greater flexibility, depending upon the height available. The wheels are grooved for use on rails. (Ontario Equipment, Inc.)

For more data circle No. 75 on postcard, p. 175

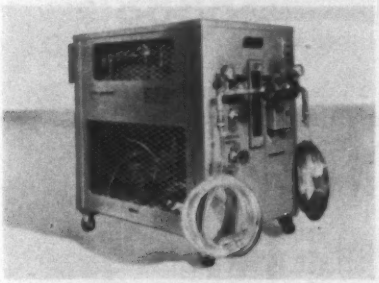
Prepares Coking Coals

Specifically for the preparation of coal for by-product coke plants, a crusher has pulverization levels equal to or better than conventional hammermills. Some of its other features are: lower "bug dust" at equal or higher pulverization levels; complete accessibility and adjustability. (Bath Iron Works Corp.)

For more data circle No. 76 on postcard, p. 175

Controls Temperature

Easily portable, a highly accurate temperature-control system is for delicate electronic instruments, sensitive mechanisms or temperature-critical chemicals, baths or compounds. The unit can maintain a selected temperature level ±2°,

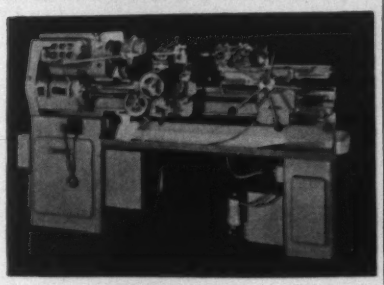


for any desired period. The system has an adjustable flow rate of 0-5 gpm of desired type liquid. The unit is mounted on four, easy-rolling casters with foot locks. (Progressive Welder & Machine Co.)

For more data circle No. 77 on postcard, p. 175

Turret Lathe

Designed to meet the need for an all-purpose production tool, a universal ram-type turret lathe is equipped for turning between centers and single point threading. It also performs standard turret operations. The lathe has ample clearances to permit a wide variety of work to be machined. Bar capacity is 1½ in. Swing over bed ways is 15 in. and swing over cross-slide is 8 in. These clearances permit the



lathe to be used as a chucking machine as well as for bar work. The ram turret has six working stations. (Sheldon Machine Co., Inc.)

For more data circle No. 78 on postcard, p. 175

Scanning Device

For data processing systems, an optical scanning device reads handwritten markings on a standard 90-column tabulating card. It also punches the appropriate code holes into the same card. It does all this work at the speed of 150 cards per minute. It does not require the use of a special magnetic pencil. Any soft lead pencil will do. Also, no special symbols are needed. In the factory, reports for production control can be made directly from the shop floor. (Remington Rand)

For more data circle No. 79 on postcard, p. 175

Cutter Grinder

A bench-type cutter grinder can be used for all engraving cutters used on pantograph machines and all two-lip milling cutters. The grinder enables the most inexperienced operator to grind cutters concentrically with any desired profile and proper clearance. The unit has an automatic setting for angular and clearance uniformity. (New Hermes Engraving Machine Corp.)

For more data circle No. 80 on postcard, p. 175

Drill Press

With variable-speed drive, a 20-in. drill press performs both high- and low-speed drilling operations on one drill press. The press incorporates a two-speed motor with the variable-speed drive. The spin-

Large or small INDUSTRIAL CUT GEARS

- FURNISHED COMPLETE
- CUSTOM CUT FROM YOUR BLANKS
- HEAT-TREATED, CASE OR FLAME-HARDENED

SIMONDS GEAR produces a complete line of industrial cut gears in a full range of sizes from cast or forged steel, gray iron, bronze, Meehanite, rawhide or bakelite. Also heat-treated, case or flame-hardened carbon or alloy steel. Or, you may have your own gear blanks custom cut to your order. Same quality . . . same prompt service. Send us your requirements for quotation.

ALSO stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

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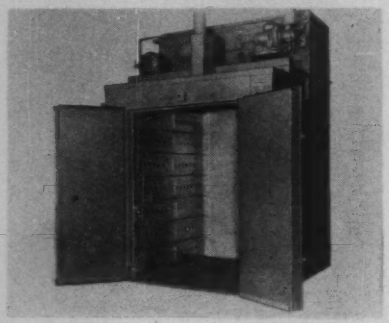
Quality Gears for over 65 Years

dle speed range is from 120-1750 rpm. With this unit, it is possible to perform any drill requirement from reaming, spot-facing and tapping to polishing and high-speed drilling on a single drill press. (Powermatic Machine Co.)

For more data circle No. 81 on postcard, p. 175

Batch-Type Ovens

Batch-type production ovens, assembled from stock components, offer flexibility with economy. These



ovens can utilize steam, gas or electric heat. Uses include baking various types of finishes, pre-heating, drying and similar work not involving continuous processing. Loading is accomplished by means of stationary racks, trays, trucks or hand-operated monorail conveyors. The batch ovens feature insulated panel construction. The insulation is compressed between 20-gage mild steel to prevent sagging. The 14-gage mild steel floor withstands wear and keeps oven panels in alignment. A circulating fan provides uniform heat distribution. (The DeVilbiss Co.)

For more data circle No. 82 on postcard, p. 175

Cutoff Machine

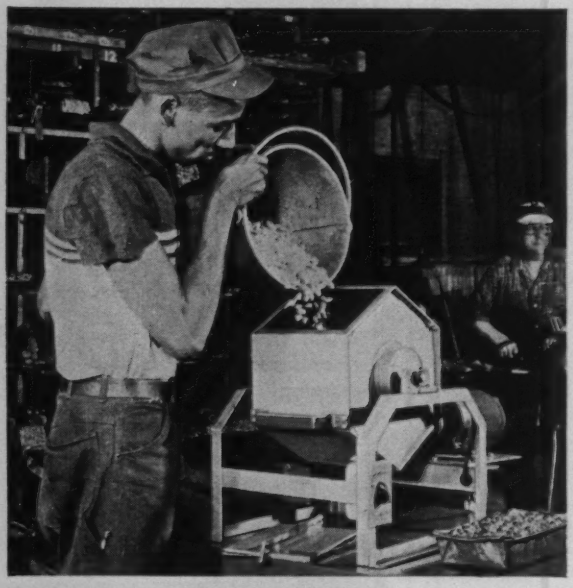
For tubing, extruded shapes and bars, both ferrous and nonferrous, an automatic cutoff machine eliminates the need for more expensive machines normally used for this work. The machine is completely air-operated. All controls for cutting head and material feed are non-electrical. It will cut most shapes to 3 in. in standard bar lengths; solid stock to 1¼ in. Feed stroke is variable from 3/16-8 in. It features quick setup for semi-automatic or completely automatic cycling. (Cleveland Pneumatic Industries, Inc.)

For more data circle No. 83 on postcard, p. 175

Corrosion Meter

For the quick, accurate corrosion measurements required in the field

of corrosion technology, a corrosion meter is ideally suited for either laboratory or rugged in-the-field op-



NEW, LOW COST HANDEE SLIDE-ABRADER BARREL FINISHES SMALL PARTS, PAYS FOR ITSELF IN JUST 15 RUNS!

Precision down to a micro-inch finish on production and experimental jobs. Portable, compact, weighs 63½ lbs. 2-speed drive, ¼ HP, 18 and 24 RPM. Barrel Capacity ¾ cu. ft. Drum dia. 13". Write for brochure. **Price $198.50**

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perforating company

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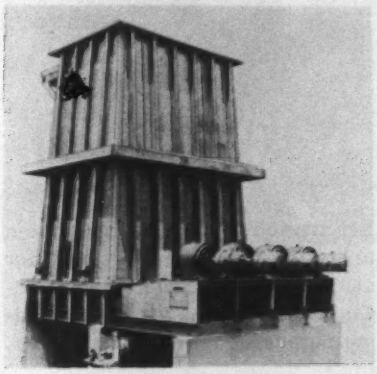
eration. It weighs only 11 lb. Outside dimensions of the instrument in its anodized hard aluminum case are a compact 12 x 10 x 5¼ in. (Crest Instruments)

For more data circle No. 84 on postcard, p. 175

Live Bottom Bins

For continuous operation, a line of live bottom bins meets full A.S.M.E. requirements. The "live bottom" consists of heavy duty, continuous welded screw conveyors, gear driven in groups of three from

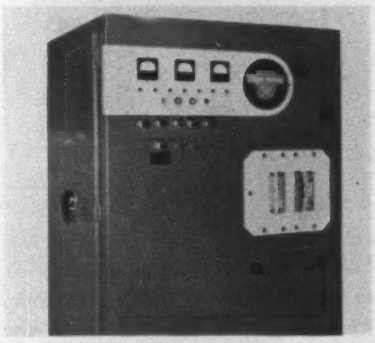


variable or constant speed drives. Live bottom sections or complete bins come in a wide range of sizes in standard steel or stainless steel construction. (Sprout, Waldron & Co.)

For more data circle No. 85 on postcard, p. 175

High or Low Frequency

By merely flicking the selector switch, a 30-kw generator is capable of producing power at both high and low frequencies. The unit can be operated at low frequencies of from 250-450 kc, and from 1-7



megacycles. All controls have been built into the unit and operate externally. Coils and fixtures are mounted in front of the generator for connection to the outputs. The generator can be adapted to such diverse applications as soldering, brazing, annealing and hardening. (Induction Heating Corp.)

For more data circle No. 86 on postcard, p. 175

All-Purpose Saw

With two-speed operation, a heavy-duty all-purpose saw cuts flush up or down, left or right, without additional attachments. It has the ability to operate in any cutting position. The saw's two-speed operation is essential to the cutting of a full range of materials. High speed is 3000 strokes per minute; low speed is 2200 strokes per minute. (Stanley Electric Tools)

For mroe data circle No. 87 on postcard, p. 175

Bar-Stock Cut-Off

With no loss of metal, no cracked or split ends, a bar cutting machine gives smooth, square and clean cuts. The machine is built in three sizes for bar stock up to 1, 2 and 2¾ in.

"GREAT SCOTT, PETE, SEVEN PILOT MODELS IN THE LAST THREE MONTHS AND STILL YOU'RE CHANGING IT? THE TOOLING COSTS, DUMBKOFF, THE TOOLING COSTS!"
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in diam. The machine cuts round, square, hexagon, octagon and many other of the standard bar shapes. Metals cut with this machine include aluminum, brass, titanium, steel and other structural metals. The harder the metal, the better the cut. The machine will cut heat-treated bar stock without prior anneal. There are no burrs after cutting. (Salem-Brosius, Inc.)

For more data circle No. 88 on postcard, p. 175

Inert Arc AC Welders

With NEMA-rated outputs of 200, 300 and 400 amp, three inert arc ac welding machines do not need complicated timers. Incorporated in the unit is a spark gap oscillator with silencing circuit included. This produces high-frequency pulses for instant starting and arc stabilization. Automatic remote control is provided for high frequency, gas and water by means of a switch which may be attached to the welding torch. At the end of the weld, gas afterflow continues for a preset period of time and then shuts off automatically. (Metal & Thermit Corp.)

For more data circle No. 89 on postcard, p. 175

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND COMPANY

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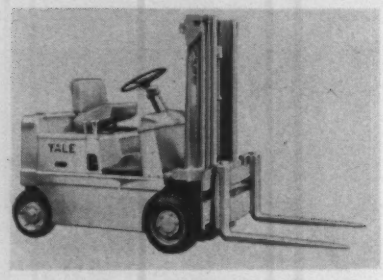
Lift Truck

Gasoline or LP-gas powered, a lift truck has fully automatic, constant mesh torque transmission and a dual brake-inching pedal. Ease



of maintenance is a feature of this series. The trucks come in capacities of 3000, 4000 and 5000 lb. (The Yale & Towne Mfg. Co.)

For more data circle No. 90 on postcard, p. 175

Check-Out System

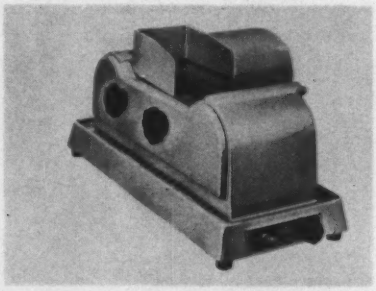
An all-parameter automatic testing system checks any characteristic convertible to an electrical equivalent. Not only checking ordinary voltage and current, it also tests modulated and unmodulated frequencies up to the 3000 mega-

cycle range. In addition it tests pulses with very low rise time and duration. Using replaceable intelligence units, the system is not obsoleted whenever it becomes necessary to check new characteristics. It is possible to check up to 9999 different points with an accuracy of ±0.5 pct or better, in a single system. (Audiotronics Co.)

For more data write No. 91 on postcard, p. 175

Grinding Machine

Fully guarded for operator's protection, a belt surfacer provides wet operation, compact design and a large 4- x 9-in. grinding surface. Belt changing is a simple matter.

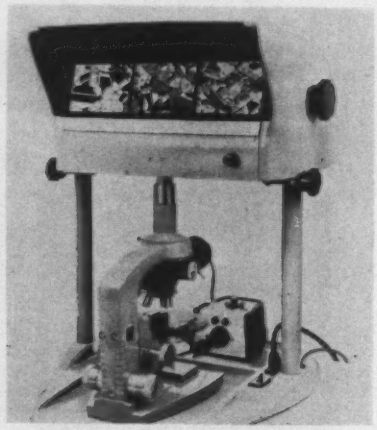


Belt tension is constant. In addition to its use as a coarse grinder for metallographic samples, the machine is also ideal for other grinding purposes, wet or dry. (Buehler, Ltd.)

For more data write No. 92 on postcard, p. 175

Determines Grain Size

For rapid determination of grain size in copper and copper-base alloys, a micrographex comparator is compact and portable. An external reflecting element, incorporated into the housing, insures prop-



er alignment of the microscope. Mounting the specimen on the microscope stage and rotating the standard micrographs determine grain size. (General Scientific Equipment Co.)

For more data write No. 93 on postcard, p. 175

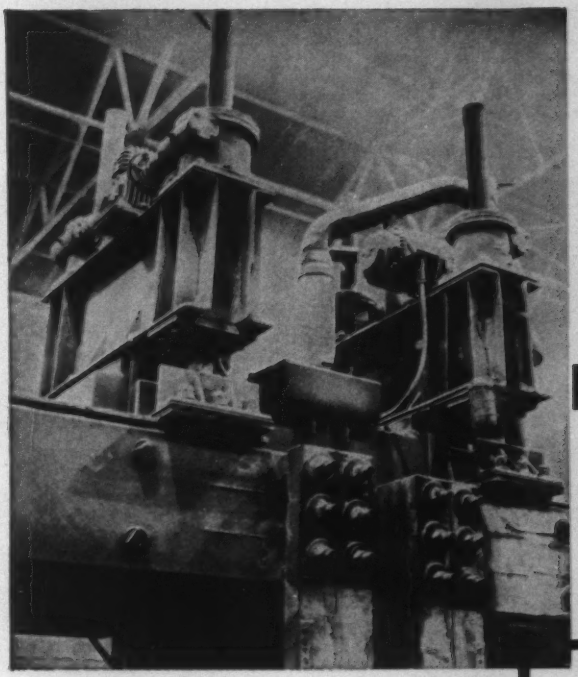
NEW BOOKS

"Patternmaker's Manual" contains all the tables, charts, diagrams and formulas essential to daily use by trained patternmakers. Eight new chapters give current up-to-the-minute information. Subject matter ranges from aptitudes required of anyone who wishes to be a patternmaker or foundryman, to all new materials, methods and applications. 406 pages. $9.50. American Foundryman's Society, Golf & Wolf Rds., Des Plaines, Ill.

"1959 References on Fatigue (STP 9-k)" consists of about 460 entries. It provides an extensive source of information on articles published in 1959. This information deals with fatigue of structures and materials. The material is so arranged that individual references can be cut apart for filing according to any desired plan. 88 pp. $4.00 each. ASTM Headquarters, 1916 Race St., Philadelphia 3.

"Ultrasonic Welding" discusses concisely the process which, of all welding processes, is regarded by some as having the greatest potential for future development. Many similar and dissimilar metals can be welded by this process. The booklet contains sections discussing fundamentals of the process, the metals which can be welded, welding techniques, equipment and uses. 38 pages. 29 illustrations. $1.50 each. American Welding Society, 33 West 39th St., New York 18.

"Tool Engineers Handbook," second edition (1960), is an outstanding volume. It covers all phases of the tool engineering function used in mechanical processing of finished products. The book also covers the latest in tool design, fabrication, maintenance and utilization. This edition has been completely updated in line with modern materials, methods and machines. Such topics as spark machining electrolytic grind-



100 million pounds per year

That's how much aluminum a modern reduction plant equipped with 1000 Cone-Drive **double-enveloping worm** gearmotors produces. Gearmotors control anodes and casings on the electric furnaces. Ambient temperatures to 300° F and constant reversing are encountered.

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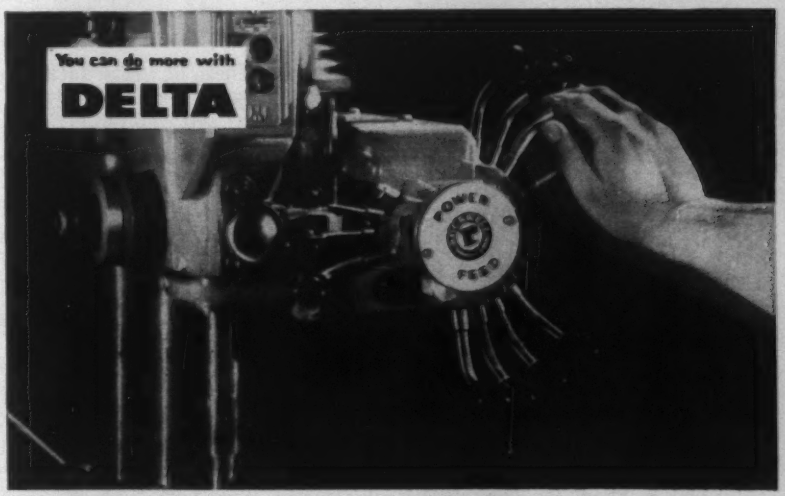

New concept in power feeds

Rockwell announces a new line of Delta 20" Power Feed Drill Presses with a totally different concept: fitting the mechanical control movements of the machine to the natural, easy motion of the operator's hand. This makes possible a simple, low cost method of increasing productivity and improving drilling quality.

Such an advanced development in mechanical power feeds offers advantages *never before available* on a standard drill press—up front control for effortless one hand operation; infinitely adjustable drill point pressure; and a built-in feature for remote control or interlocking with automation devices. Write for free brochure on floor, bench, overhead and multiple-spindle models. Rockwell Manufacturing Company, Delta Power Tool Division, 640K N. Lexington Ave., Pittsburgh 8, Pa.

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Oakite CrysCoat® zinc phosphate coatings keep rain and rust from ruining steel

Oakite CrysCoat *zinc* phosphate pre-paint treatment provides lasting corrosion resistance beneath paint under all kinds of heavy punishment.

First, it locks paint and steel together. Then, it beats back corrosion at any point of future paint damage. Test panels usually last well over 1,000 hours in salt spray tests—*four times* the 250 hours required by government specifications.

CrysCoat zinc phosphate coatings are easy to control, too. You use only *one* material for make-up . . . the *same* material for up-keep . . . only *one* simple titration test for analysis—no chance to go wrong on material, or with the wrong concentration.

In the family of Oakite CrysCoat processes there are zinc phosphate as well as iron phosphate materials . . . for spray application and for tank dip . . . for room temperature or heated operation. You can count on *all* to give products lasting protection, lasting appeal. But there's a *right* one to match your protection and/or economic requirements. Ask the Oakite man to help you select it. Meanwhile, write for Bulletin F-8979. Oakite Products, Inc., 38H Rector Street, New York 6, N. Y.

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NEW BOOKS

ing, ultrasonic cleaning and many others are covered in an easy to read manner. The vast ten-year task of planning and writing the 2289-page handbook was participated in by 387 authorities from all branches of the industry. Price is $19.50 per copy. McGraw-Hill Book Co., Inc., 330 West 42nd St., N. Y. 36.

"Literature Review of Infra-Red Energy Produced with Gas Burners" evaluates quite extensively the available literature pertaining to infra-red energy. The publication fills a great need for consolidated background information. Gas - fired infra - red burners are described and evaluated. Their energy output is compared to infra-red energy generated by other means. The bulletin also gives an extensive list of possible future applications to stimulate thinking toward broadening the field for use of this type of energy. 49 pp. $2.00 each. American Gas Assoc. Laboratories, 1032 East 62nd St., Cleveland 3.

"Mechanical Press Handbook" covers the range of mechanical press design and use from basic components to highly-complex, complete operating units. The book has 15 chapters; two deal with transfer and high-productivity presses. About half the space on transfer presses is devoted to loading and slide design. 256 pp. $5.00 each. Metalworking Magazine, 221 Columbus Ave., Boston.

"Current Tests for Evaluating Fracture Toughness of Sheet Metals at High Strength Levels," by J. E. Campbell and W. P. Achbach, reviews tests developed to measure the fracture toughness of high-strength sheet metals. Some of the tests included are: tensile loading of notched specimens; bending of flat and notched specimens; impact loading of notched specimens. 71 pp. $2.00 each. Order PB 151081, Office of Technical Services, U. S. Department of Commerce, Washington 25.

The Iron Age Summary

Users Bet on No Price Increase

No buildup in advance of Dec. 1 wage increase is likely. Consumers scorn price-hedge buying.

It's just another factor in the general market pessimism. No major improvement in the near future.

■ Steel users are not considering possible steel price increases in their buying plans.

This means that price hedging in advance of the Dec. 1 wage increase to steelworkers can be discounted as stimulating November steel orders. This is just another reason why the steel market is not likely to make a significant recovery this year.

Some Good Signs—Some signs of better business are observed, particularly in the Midwest where activity is more brisk than in other areas. It is the absence of new strength in major markets for steel that holds orders, operations, and shipments at a low level.

On the price front, the steel companies maintain they will eventually have to have relief from high manufacturing costs. However, the competitive factors outweigh higher price pressures now.

Need Better Business — Steel users, in evaluating the market, believe that the industry operating rate, now in the mid-50's, will have to go over 70 pct before steelmakers can consider anything more than a few highly-selective price increases.

Meanwhile, these pressures are working against steel price increases:

Automakers have already based their 1961 prices (which either hold the line or are slightly lower) on no changes in steel prices.

Appliance prices have been cut. There cuts were made on the assumption of no higher prices for steel.

Canmakers are using new developments in aluminum as a lever to keep tinplate prices from going up.

General market conditions tend to tempt individual steelmakers to make price concessions, not to raise prices. While this market condition exists, price increases are unlikely. As yet, steelmakers have not indicated any price change plans.

Automotive Questions—As production of 1961 cars swings into full schedules, the impact of new designs and market changes is having its effect on automotive steel buying.

The average compact car now takes about 800 lb less steel than last year's standard models. But this year's standard model is also shorter, narrower, and lighter. It takes about 150 lb less steel than last year's counterpart.

On a 60-40 Basis—If the market this year is going to break down at 60 pct standard models, 40 pct compacts, a weighted average results in about 410 lb less steel per car.

This may account for the somewhat smaller tonnages of steel ordered by the auto companies than might be expected in a top production month. Auto steel orders, while maintaining a relatively high level, are still less than expected for this time.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,556	1,579	1,547	371
Ingot Index				
(1947-1949=100)	96.9	98.3	96.3	23.1
Operating Rates				
North East Coast	58.0	62.0*	62.0	12.0†
Buffalo	58.0	56.0*	59.0	0.0†
Pittsburgh	48.0	46.0*	42.0	29.0†
Youngstown	43.0	46.0	47.0	10.0†
Cleveland	55.0	56.0*	55.0	0.0†
Detroit	69.0	69.0*	71.0	23.0†
Chicago	58.0	60.0*	61.0	5.0†
Cincinnati	63.0	62.0	57.0	69.0†
St. Louis	75.0	78.0*	77.0	102.0†
South	52.0	51.0*	47.0	12.0†
West	54.0	56.0*	55.0	0.0†
U. S. Rate	54.6	55.4	54.3	13.1

*Revised †IRON AGE Estimates

Source: American Iron and Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$29.50	$29.83	$31.83	$45.17
No. 2 bundles	$20.17	$20.17	$22.17	$30.50
Nonferrous				
Aluminum ingot	26.00	26.00	26.00	26.80
Copper, electrolytic	33.00	33.00	33.00	30-31.5
Lead, St. Louis	11.80	11.80	11.80	12.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	103.125	103.75	102.00	102.125
Zinc, E. St. Louis	13.00	13.00	13.00	12.00

Speed Pays in Space Age Buying

Jack Benzie is a space age purchasing agent for the General Electric Co.

The demands on his department are many and have to be handled with utmost speed.

■ Buying in the space age sets a fast and furious pace for the purchasing agent. It means new and unusual work for metalworking and it opens a new dimension in purchasing. And Jack Benzie, manager of purchasing for General Electric Co.'s Missile and Space Vehicle Dept., Philadelphia, is one man who is keeping the pace in this new era of buying.

Says Mr. Benzie, "Our purchasing varies a great deal from systems used by makers of appliances and other similar products. They can order months ahead and wait for deliveries. In our department 60 pct of the orders must be filled in 10 days or less, and 90 pct in 15 days or less."

Top Demands — To keep the hundreds of engineers employed in the job of building nose cones for missiles and space vehicles, to meet their demands on necessarily short notice, and to make sure that delivery dates are met, Mr. Benzie has a staff of 14 buyers and a supporting group. These men see 13,500 vendors a year and handle about 35,000 purchase orders annually.

Another different point about Mr. Benzie's operation is that there is no excuse for missing a shipping date. He says that no matter when final specifications are delivered from engineering (and this can be up to the last minute because of an important change), it's his department's job to see that necessary items are ordered, delivered as fast as possible and the finished product is delivered to the government. In five years of operation, the Missile and Space Vehicle Dept. has never missed a shipping date.

Good Relations — Mr. Benzie says that excellent relations with his vendors has helped attain this record. Of total vendors, 79 pct represent small business, and 55 pct of the purchasing dollar is directed to small companies throughout the nation.

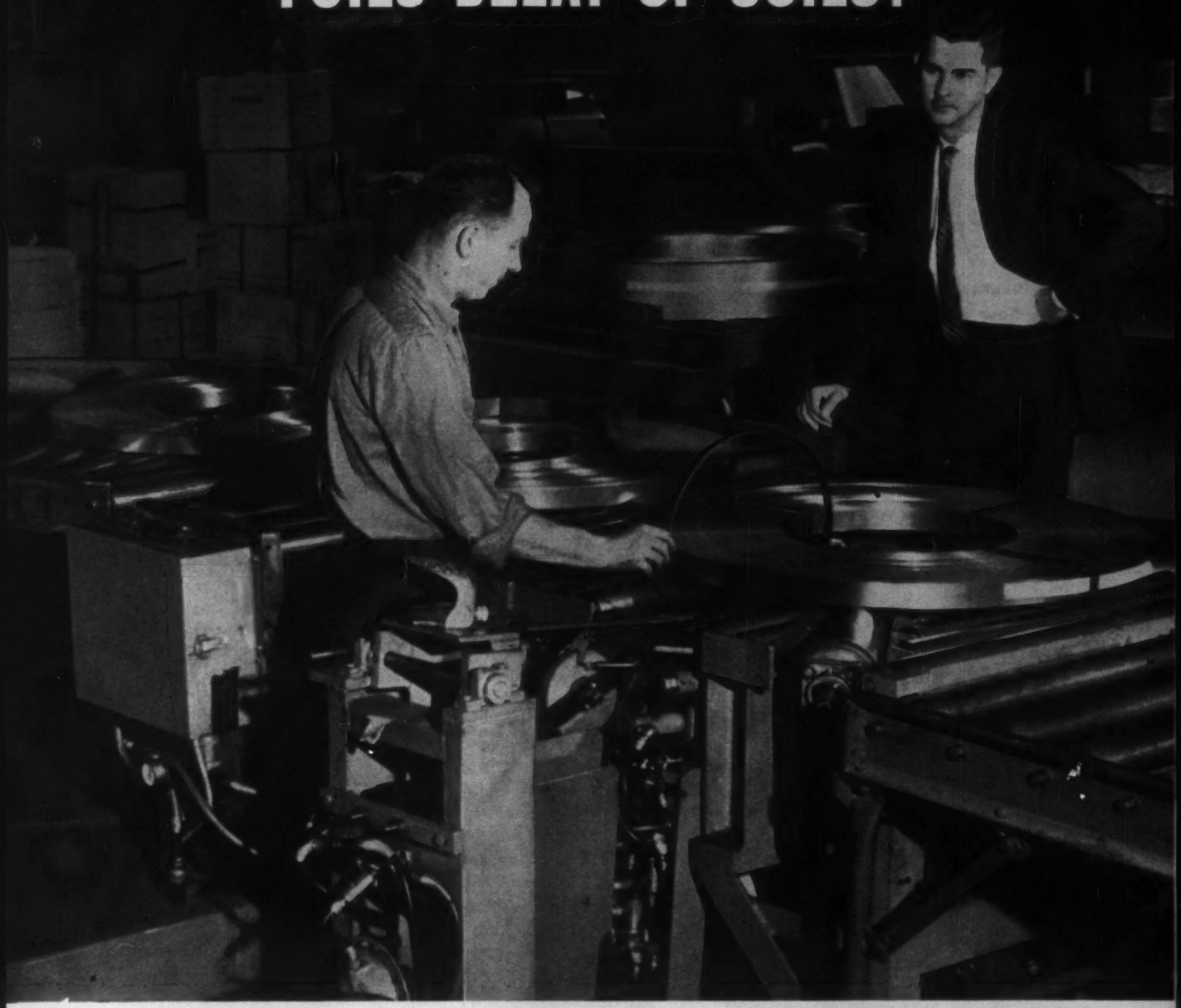
One problem that Mr. Benzie faces is the continual change of specifications by the engineers. Each time a missile is sent up, the next one will have possibly hundreds of modifications in the nose cone. He says, for example, that a contract is obtained for 10 nose cones to be used on a certain missile. It would seem simple to order enough equipment for all at one time, but in reality, no two will be alike as research and development are constantly being done. Reliability plays a big part in GE's buying program. Vendors must make guaranteed parts for missile use.

Fast Advice—In order to keep delivery dates as close to schedule as possible, GE has a team of expediters on the road constantly. Whenever a supplier runs into any difficulty, an expediter can be at his plant within 24 hours. This is done, says Mr. Benzie, to prevent delay in getting equipment to the GE plant at the specified time.

Close Watch—In order to keep a close watch on just what is happening in the purchasing department, GE uses an integrated data processing system. Weekly reports are issued on the number of purchase orders made by projects and the number of orders in process. Also, details are kept regarding the work with particular vendors.

JACK BENZIE: A new look at buying.

FOILS DELAY OF COILS!



Acme Idea Man Gene Fairbank (right) suggested Idea No. S4-12 to United Flat Rolled Products, Chicago.

United Flat Rolled Products, Chicago, beat bottlenecks in slit coil production with a conveyorized Acme Steel F4 Strapping Machine—and tripled production capacity in the process!

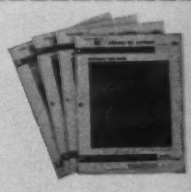
Slow hand strapping methods tied up slitting equipment as much as 45 minutes per hour. Now, slit coils flow smoothly from slitter to strapping machine on roller conveyors. One operator, handling both coil tying and unitizing operations, keeps well ahead of two slitters.

Solving sluggish production problems is an every-day challenge to your Acme Idea Man. For full details, call him or clip the coupon.

ACME STEEL IDEA LEADER IN **STRAPPING**

ACME STEEL COMPANY
Acme Steel Products Division
Dept. IFS-100
135th St. & Perry Ave.
Chicago 27, Ill.

Please send me Idea No. S4-12 and examples of how major companies in my field use Acme Steel Strapping.



*Name*_____

*Title*_____

*Firm*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

Buyer Plans Keep Mills Guessing

Steelmakers have trouble estimating how many orders will come in during a month.

Reason: Orders may be pushed ahead, others deferred. And in some cases, rush tonnage may be added to rollings.

■ Steel buyers can keep mills in the dark about buying intentions very easily these days.

All the factors operate in the buyer's favor. Products are easily available in practically all cases. Lead times have been bared to the bone. Rapid shipment must be promised if a mill wants an order. Buyers, still anxious to hold down inventories, can delay orders until the last minute.

Guessing Game — As a result, mills seldom know how strong sales will be even next month. With advance ordering limited, it's tough guessing how much business will be on the books at month's end. Both orders and cancellations come in flurries.

Moving Up and Back — Some orders may be pushed ahead, others shoved back. And unexpected, but welcome, tonnages may come in at any time. "Lead time is a thing of the past," says a sales official for one major mill. "Usually you're trying to meet delivery requirements so another producer won't get the order."

Because of all this, present mill reports on October and November are not encouraging. In some cases, the steelmakers have been hit by a flurry of postponements. These generally involve sheet products. But other items—including standard pipe and hot-rolled bars—are doing a little better at Eastern mills. Midwest service centers are encouraged by some sales gain for sheet, strip, and cold-drawn bar.

Sheet and Strip—October bookings for sheet are showing little, if any, improvement over September. On the contrary, some **Pittsburgh** mills last week received a batch of deferments. Sheet orders sagged at **East Coast** mills when some tonnage for auto suppliers was pushed back. At **Cleveland,** auto accounts are the leading buyers of cold-rolled sheet. Appliance makers are less active. With the coming of the fall, the export market for sheet has fallen off.

Mills at **Chicago** report some mild gains. But delivery times are still very short. Two-week shipment of hot-rolled sheet is common, with cold-rolled available in the same time. Advance ordering remains light. Many customers say they plan to keep holding inventories down. Makers of farm equipment and earthmoving machinery estimate they will continue present buying levels through November. After that, they may expand sheet orders, if their own sales pick up.

PURCHASING AGENT'S CHECKLIST

Vacuum melters are confident they can develop strong commercial markets. P. 113

Competition grows in the aluminum can market. P. 119

One-coat porcelain-enameling sheet doesn't require a ground coating. P. 151

Bar—In some markets, bars are showing a little more strength. But it's nothing spectacular. Mills at **Pittsburgh** say October hot-rolled tonnage is up over September. However, users are still asking for —and getting — rush delivery. **Cleveland** area producers say user stocks of forging bars are very low. But the forgers are running at less then 50 pct of capacity. And they are ordering steel only when they get releases from their customers.

At **Chicago,** hot-rolled producers are encouraged by some slight gains. But warehouses there are not finding any strong sales interest and some service centers are still cutting down their stocks. Cold-drawers are offering delivery on stock sizes in as little as 24 hours.

Pipe and Tubing—Standard pipe orders at **Pittsburgh** mills are moving up at a steady rate. Shipments have increased during the last three months. Reasons for the improvement: Good construction weather, plus a seasonal buildup in jobber stocks. But, in most cases, mills can still give buyers 24-hour service

Stainless—Some distributors are starting to build up inventories. This has given a little spurt to the market, especially in the **Cleveland** area. But, overall business is still slow. **Detroit** stainless mills are not encouraged about sales for 1960. They point out the compact cars will have very little stainless trim.

Pig Iron—Some merchant furnaces in the **Midwest** are going back into production. But this isn't due to any violent upsurge in sales. Apparently the producers feel it's time to do a little inventory building against future orders. Some pig iron makers do point out orders have been improving about 10 pct a month since July.

Nine Months Production—During the first nine months of '60, mills turned out 80.3 million tons of ingots and steel for castings, the American Iron and Steel institute reports. This compares with 72.4 million tons last year, when the strike reduced output.

COMPARISON OF PRICES

(Effective Oct. 18, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Oct. 18 1960	Oct. 11 1960	Sept. 20 1960	Oct. 20 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Oct. 18 1960	Oct. 11 1960	Sept. 20 1960	Oct. 20 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.57
Foundry, South Cin'ti.	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$28.50*	$29.50	$31.50	$46.50
No. 1 steel, Phila. area	33.50	33.50	34.50	44.50
No. 1 steel, Chicago	26.50	26.50	29.50	44.50
No. 1 bundles, Detroit	25.50	25.50	28.50	39.50
Low phos., Youngstown	29.50*	32.00	34.50	47.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	47.50	54.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	53.50
No. 1 mach'y cast, Chicago	41.50	41.50	45.50	64.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$29.50*	$29.83	$31.83	$45.17
No. 2 bundles	20.17	20.17	22.17	30.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	30-31.50
Copper, Lake, Conn.	33.00	33.00	33.00	31.50
Tin, Straits, N. Y.	103.125†	103.75	102.00	102.125
Zinc, East St. Louis	13.00	13.00	13.00	12.00
Lead, St. Louis	11.80	11.80	11.80	12.80
Aluminum, ingot	26.00	26.00	26.00	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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* Appears in the Oct. 13 - Oct. 27 issues.

Are Any Markets Really Firming?

There are several areas reporting somewhat firmer markets this week.

Nevertheless, dealers are still pessimistic and prices are still lower.

■ Prices continue to decline this week, but several areas report slight signs of a somewhat firmer market. Nevertheless, the overall picture is still one of definite weakness.

The IRON AGE composite price for No. 1 heavy melting scrap dropped from $29.83 last week to $29.50 this week. The price for No. 2 bundles remains unchanged.

New York reports that export business is moving again with prices at the current levels. But dealers there admit that it wouldn't take too much of a push to start prices downward again.

The story's the same in Chicago, Cleveland and Philadelphia. Prices in Cincinnati are the lowest in ten years, and local buyers are out of the market in Pittsburgh.

As for now, it's just a case of dealers trying to outwait buyers. And buyers appear in no hurry to order.

Pittsburgh — The market continues in a lag that is called the worst in years. The slowdown blankets all districts and takes in both mills and foundries. On a late list, No. 1 railroad heavy melting went for $34 domestically and under $36 for export. Both figures are down from last month, but the domestic price is $2 to $3 over the figures reported for railroad offerings earlier this month. This is taken by some to mean a general bottom for prices. However, mills in nearby districts have dropped prices for No. 1 and No. 2 dealer grades. With local buyers out of the market, this action brought selective reductions.

Chicago—The market continues weak, but new sales in electric furnace grades at slightly higher prices had a bolstering effect. While the outlook continues weak, dealer sales at new price levels appear to be falling off. The result is that the market is at least somewhat firmer than a week ago.

Philadelphia—There is still very little domestic activity. Exports, though weakening, are still responsible for nearly 90 pct of the area scrap movement. Most scrapmen are pessimistic and don't see any upturn before January. Because of the lack of activity, most prices remain unchanged.

New York—Export business is moving again, confirming prices at current levels. However, domestic buying continues to be almost nonexistent. While dealers say prices have definitely firmed up after last week, they note there is still no real strength in the market. They admit it wouldn't take much pressure to push prices to the brink of another drop.

Detroit—In the absence of sales, dealers are looking for lower prices on the coming November industrial lists. Canada won't be any help in absorbing another large scrap offering by automakers. Overseas shipment is no longer a factor since the Lakes season is nearing an end.

Cleveland—A Valley mill came into the market for guaranteed analysis electric furnace scrap at $30. Tonnage was quickly filled from yards there and in Cleveland. No. 1 bundles and busheling are off up to $1.50 and heavy melting is off up to $2. Other grades are generally off $1.

Cincinnati—Prices are at a 10-year low with no change in sight. Local bundles are going to upriver mills and some are being laid down. Some cast iron is going south to Alabama for soil pipe. But dealers must compete for this with Mississippi barge shipments from as far as Minnesota.

St. Louis—Despite the fact that mills are operating well above the rest of the nation, scrap prices remain depressed. Mills just won't pay more for scrap and are reaching out in broader areas to fill their needs. The outlook, therefore, is drab. But some dealers feel prices have about reached bottom and that an upturn is in sight.

Birmingham—Scrap movement is at a virtual standstill and only limited buying is anticipated for the rest of the month. The lack of activity in the foundry market is considered by some as an indication that consumers had decided there will be no price increase. Yet the prices remain unchanged in the slow market.

Buffalo — There were no new sales this week and dealers are now filling back orders delayed by the rail strike. The general market and the prices remain unchanged.

Boston—The market is very dull. There is very little doing and prices are weak.

West Coast—Dealers report that export is down sharply. Major mills continue out of the market. Very little scrap is moving, even at reduced prices.

Houston — A few export shipments are on the horizon but there is no activity at this time. The cast market is especially quiet. One mill had authorized a price of $32 for remote No. 2 scrap.

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DAYTON	LOS ANGELES	PITTSBURGH	WORCESTER

SCRAP PRICES *(Effective Oct. 18, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	30.00 to 31.00
No. 1 factory bundles	35.00 to 36.00
No. 2 bundles	23.00 to 24.00
No. 1 busheling	28.00 to 29.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	17.00 to 18.00
Low phos. punch'gs plate	35.00 to 36.00
Heavy turnings	25.00 to 26.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	43.00 to 44.00
Rails 2 ft. and under	48.00 to 49.00
RR specialties	39.00 to 40.00
No. 1 machinery cast	45.00 to 46.00
Cupola Cast	35.00 to 36.00
Heavy breakable cast	33.00 to 34.00
Stainless	
18-8 bundles and solids	185.00 to 190.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	90.00 to 95.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy melting	24.00 to 25.00
No. 1 dealer bundles	27.00 to 28.00
No. 1 factory bundles	31.00 to 32.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	26.00 to 28.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. forge crops	36.00 to 38.00
Low phos. punch'gs plate, ¼ in. and heavier	32.00 to 34.00
Low phos. 2 ft. and under	30.00 to 32.00
No. 1 RR hvy. melting	31.00 to 32.00
Scrap, rails, random lgth.	38.00 to 39.00
Rerolling rails	48.00 to 50.00
Rails 2 ft. and under	42.00 to 43.00
Angles and splice bars	39.00 to 40.00
RR steel car axles	47.00 to 48.00
RR couplers and knuckles	36.00 to 37.00
No. 1 machinery cast	41.00 to 42.00
Cupola cast	36.00 to 37.00
Cast iron wheel	27.00 to 28.00
Malleable	40.00 to 41.00
Stove plate	30.00 to 31.00
Steel car wheels	35.00 to 36.00
Stainless	
18-8 bundles and solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 bundles and solids	80.00 to 85.00
430 turnings	40.00 to 45.00

Philadelphia Area

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	14.00 to 15.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Clean cast. chem. borings	23.00 to 24.00
Low phos. 5 ft and under	37.00 to 38.00
Low phos. 2 ft punch'gs	39.00 to 40.00
Elec. furnace bundles	36.00 to 37.00
Heavy turnings	27.00 to 28.00
RR specialties	38.00 to 39.00
Rails, 18 in. and under	49.00 to 50.00
Cupola cast	38.00 to 39.00
Heavy breakable cast	37.00 to 38.00
Cast iron car wheels	40.00 to 41.00
Malleable	45.00 to 46.00
No. 1 machinery cast	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$24.00 to $25.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	16.00 to 17.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	10.00 to 11.00
Low phos. 18 in. and under	33.00 to 34.00
Rails, random length	38.00 to 39.00
Rails, 18 in. and under	46.00 to 47.00
No. 1 cupola cast	35.00 to 36.00
Hvy. breakable cast.	30.00 to 31.00
Drop broken cast.	45.00 to 46.00

Youngstown

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	21.50 to 22.50
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	18.50 to 19.50
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	29.00 to 30.00

Cleveland

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	17.50 to 18.50
No. 1 dealer bundles	25.50 to 26.50
No. 1 factory bundles	29.00 to 30.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	25.50 to 26.50
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft. & under	31.00 to 32.00
Low phos. punch'gs plate	26.50 to 27.50
Drop forge flashings	25.50 to 26.50
Foundry steel, 2 ft. & under	30.00 to 31.00
No. 1 RR hvy. melting	30.00 to 31.00
Rails 2 ft. and under	45.00 to 46.00
Rails 18 in. and under	46.00 to 47.00
Steel axle turnings	20.00 to 21.00
Railroad cast.	44.00 to 45.00
No. 1 machinery cast	44.00 to 45.00
Stove plate	36.00 to 37.00
Malleable	43.00 to 44.00
Stainless	
18-8 bundles	175.00 to 180.00
18-8 turnings	70.00 to 75.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 busheling	27.00 to 28.00
No. 1 dealer bundles	27.00 to 28.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	13.00 to 14.00
Low phos. plate	34.00 to 35.00
Structurals and plate, 2 ft. and under	36.00 to 37.00
Scrap rails, random lgth.	35.00 to 36.00
Rails 2 ft. and under	45.00 to 46.00
No. 1 machinery cast	45.00 to 46.00
No. 1 cupola cast	39.00 to 40.00

St. Louis

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	26.00 to 27.00
Foundry steel, 2 ft.	28.00 to 29.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	19.00 to 20.00
No. 1 RR hvy. melting	30.00 to 31.00
Rails, random lengths	36.00 to 37.00
Rails, 18 in. and under	38.00 to 39.00
RR specialties	36.00 to 37.00
Cupola cast	41.00 to 42.00
Heavy breakable cast.	33.00 to 34.00
Stove plate	35.00 to 36.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	49.00 to 50.00
Unstripped motor blocks	35.00 to 36.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	28.00 to 29.00
Machine shop turn.	17.00 to 18.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	31.00 to 32.00
Elec. furnace, 3 ft. & under	34.00 to 35.00
Bar crops and plate	38.00 to 49.00
Structural and plate, 2 ft.	37.00 to 38.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rail, random lgth.	38.00 to 39.00
Rails, 18 in. and under	44.00 to 45.00
Angles and splice bars	38.00 to 39.00
No. 1 cupola cast	46.00 to 47.00
Stove plate	46.00 to 47.00
Cast iron car wheels	36.00 to 37.00
Unstripped motor blocks	34.00 to 35.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	20.00 to 21.00
No. 2 dealer bundles	15.00 to 16.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Clean cast. chem. borings	18.00 to 19.00
No. 1 machinery cast.	37.00 to 38.00
Mixed yard cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	17.00 to 18.00
No. 1 dealer bundles	25.00 to 26.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	22.00 to 23.00
Drop forge flashings	22.00 to 23.00
Machine shop turn.	8.00 to 9.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Heavy breakable cast.	24.00 to 25.00
Mixed cupola cast.	32.00 to 33.00
Automotive cast.	38.00 to 39.00
Stainless	
18-8 bundles and solids	160.00 to 165.00
18-8 turnings	50.00 to 55.00
430 bundles and solids	55.00 to 60.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	13.00 to 14.00
No. 1 busheling	23.00 to 24.00
Machine shop turn.	3.50 to 4.50
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	31.00 to 32.00
Heavy breakable cast.	25.50 to 26.50

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	18.00
Machine shop turn.	14.00
Cast iron borings	45.00
No. 1 cupola cast.	45.00

Los Angeles

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	27.00
No. 1 dealer bundles	25.00
No. 2 bundles	17.00
Machine shop turn.	12.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furnace 1 ft. and under (foundry)	41.00
No. 1 cupola cast.	$38.00 to 39.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

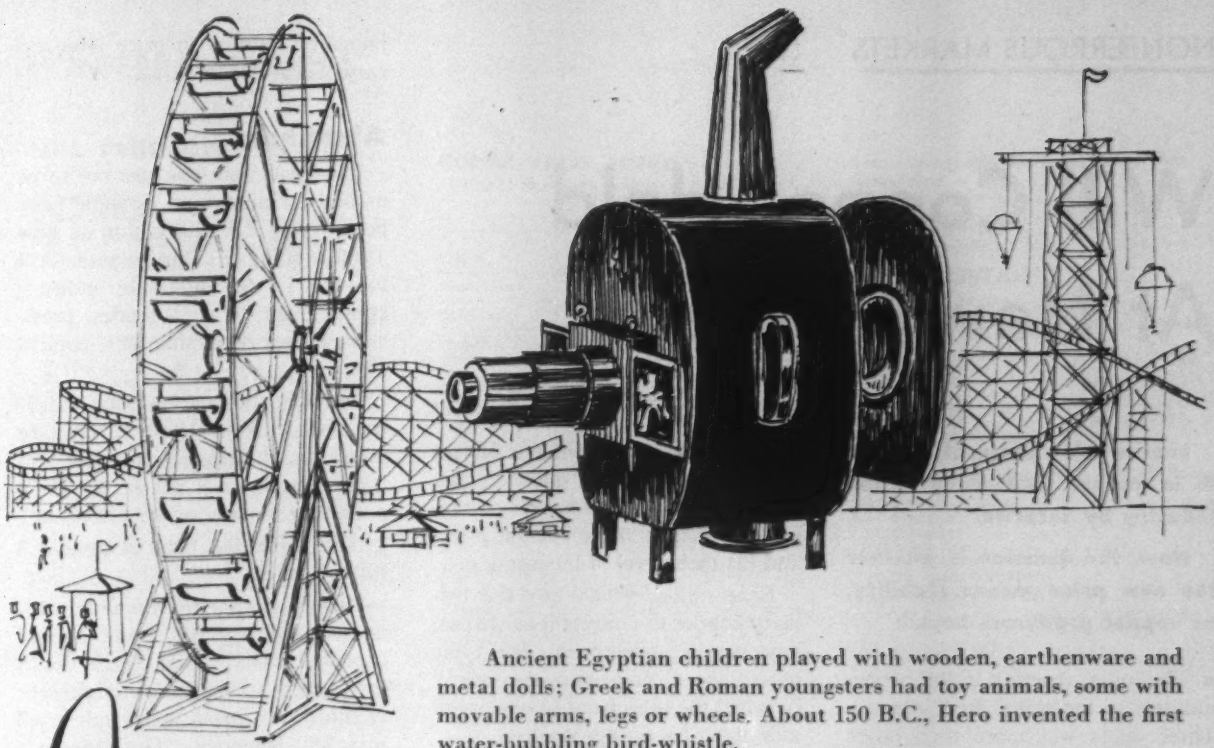
Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$25.80
No. 2 hvy. melting cut 3 ft. and under	22.50
No. 1 dealer bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Bush., new fact, prep'd	25.50
Bush., new fact, unprep'd	20.45
Machine shop turn.	10.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	33.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	30.00
No. 2 bundles	20.50
Machine shop turn.	12.00
Shoveling turnings	14.00
Cut structural plate 2 ft. & under	$38.00 to 39.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast.	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00



Just for fun

Ancient Egyptian children played with wooden, earthenware and metal dolls; Greek and Roman youngsters had toy animals, some with movable arms, legs or wheels. About 150 B.C., Hero invented the first water-bubbling bird-whistle.

It was Roger Bacon, in the thirteenth century, who discovered the possibilities of a magic lantern; Michael Faraday who pointed out a road to knowledge by way of toys; Benjamin Franklin who used the top and hoop to demonstrate centrifugal force. During the French Revolution little patriots were given model guillotines for beheading toy aristocrats.

Modern devices for fun range from toy trains, skates, construction sets and many types of wheeled vehicles, to such structures as the famous Sky Ride of the Columbian Exposition and the roller coaster and other thrillers of today's carnivals and amusement parks.

To meet demands of the multi-billion dollar "fun" market, and for countless other consumer industries, the output of iron and steel must be continuous—and scrap is a necessary ingredient.

For the purchase or sale of iron or steel scrap . . .

phone or write "Your Chicago Broker"

M. S. KAPLAN COMPANY

231 S. La Salle St., Chicago

Telephone ANdover 3-3900

1960—OUR 50th YEAR

Will Copper Hold At New Levels?

Last week's drop of 3c per lb in copper took many in the industry by surprise.

Now, the question is whether the new price means stability, as copper producers hope.

■ The initial reaction in the copper industry to the sharp drop in price: Three cents was more than might have been expected.

Kennecott Copper Corp. dropped its price 3¢ per lb, to 30¢. Phelps Dodge Copper also changed within the hour. Later, Anaconda Co. and the custom smelters went along.

Second Thoughts—With the benefit of hindsight, most of the copper people felt it was a sound move. And, possibly more important, some believe that the sharpness of the drop really means a continuation by copper producers of attempts to inject the image of stability in their price picture.

One copper man puts it like this: "If they had shaded the price just a little, the trade would have stayed off the market waiting for the price to fall further. The pressure would have been just as great for another price cut. This way the producers establish a price they have a good chance of holding."

Another says simply, "I think the new copper price is basically a sound one."

During other "correction" periods, the copper price dropped lower. In 1958, it held at 25¢ for several months. It was 24.5¢ in 1954.

Market Effects—Will the lower price bring in any more business? It's still too early to tell. The factors that will answer this question are: (1) The confidence of buyers of copper mill shapes in the current price; and (2) their level of business.

Brass mills, which buy the primary copper to convert it to shapes, have varying inventories. "We'd like to sell you a car or two of copper," reflected the sales head of one major mill about his copper stocks.

"We'll buy with the market," says the president of another. His inventory of copper is at rock bottom. He's buying almost from day-to-day, but sees no reason yet to refurbish his stocks.

Brass Mills, Too — Brass mills make it quite clear they are happy with the severity of the price drop. Almost all immediately dropped their mill prices correspondingly.

You have to compare the U. S. and foreign brass mills product-by-product to get a true competitive comparison. But the consensus is that the current price just about wipes out the cushion of lower priced copper that foreign mills have been enjoying.

While no brass mill executive would admit point blank to putting the pressure on producers to lower prices, there was no doubt they played a major role in the move.

The copper producers had maintained the 33¢ price since Nov. 12, 1959, the longest period, excepting government control, that most copper men can remember. And this was not because of the stable world situation.

The industry has pretty much agreed that to gain new markets an image of stability in price is necessary. They still think so.

Aluminum

This year may not turn out to be as bad for aluminum as some have been saying. One indication on how 1960 is going to compare with 1959 for the U. S. aluminum industry comes from D. A. Rhoades, president, Kaiser Aluminum & Chemical Corp.

Mr. Rhoades figures total industry shipments in 1960 of primary metal and fabricated products will "come to within 4 pct of the 1959 peak-year volume of 4.9 billion lb."

This would put 1960 at about 4.7 billion lb.

"The fact that the domestic aluminum industry has some unused capacity at the present time is not to be read as an indication of present or future weakness in the industry," says Mr. Rhoades. "The industry's greatly expanded capacity should be recognized for what it really is—proof of unusual position of strength to meet the inevitable coming increase in aluminum consumption."

Tin prices for the week: Oct. 12—Holiday; Oct. 13—103.75; Oct. 15—103.375; Oct. 17—103.125; Oct. 18—103.00*.

* Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	30.00	33.00	10/11/60
Copper (CS)	30.00	31.00	10/13/60
Copper (L)	30.00	33.00	10/13/60
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium Ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/8/58
Titanium sponge	150-180	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; **Other primary prices, pg. 211.**

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.6-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.6-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-33/32	3/4-1 1/16	1 3/32-1 3/8
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	54.13	.....	51.86	55.32
Brass, Yellow	48.77	49.06	48.46	52.43
Brass, Low	51.25	51.54	50.94	54.81
Brass, Red	52.12	52.41	51.81	55.68
Brass, Naval	53.58	59.89	47.14	57.24
Munts Metal	51.64	.....	46.70	.....
Comm. Bz.	53.53	53.82	53.22	56.84
Mang. Bz.	57.27	.....	50.71	.....
Phos. Bz. 5%	74.70	74.95	75.45	76.63

Free Cutting Brass Rod..... 34.48

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb)..... $1.50 to $1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9%, dollars per troy oz.. $2.25
Iridium, dollars per troy oz..... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz... $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 28.25
- No. 120 ..... 27.25
- No. 123 ..... 26.25

80-10-10 ingot
- No. 305 ..... 32.75
- No. 315 ..... 30.50

88-10-2 ingot
- No. 210 ..... 40.50
- No. 215 ..... 37.25
- No. 245 ..... 32.50

Yellow ingot
- No. 405 ..... 23.50

Manganese bronze
- No. 421 ..... 27.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type).. 26.00-27.00
No. 12 alum. (No. 2 grade)... 22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.)... 24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

(Effective Oct. 18, 1960)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 23.75-24.75
Grade 2—92-95% 22.50-23.50
Grade 3—90-92% 21.50-22.50
Grade 4—85-90% 21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 24¾
No. 2 copper wire 22¾
Light copper 20½
*Refining brass 20¾
Copper bearing material 19
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 24½
No. 2 copper wire 22¾
Light copper 20½
No. 1 composition 20¼
No. 1 comp. turnings 19¾
Hvy. yellow brass solids 15½
Brass pipe 14
Radiators 16¼

Aluminum

Mixed old cast. ..... 13 —13½
Mixed new clips ..... 14½—15
Mixed turnings, dry ..... 13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 21½—22
No. 2 copper wire ..... 19½—20
Light copper ..... 17½—18
Auto radiators (unsweated).. 12½—12¾
No. 1 composition ..... 16½—17
No. 1 composition turnings... 15¼—15¾
Cocks and faucets ..... 12¾—13¼
Clean heavy yellow brass ... 11¾—12¼
Brass pipe ..... 13¼—13¾
New soft brass clippings .... 13¼—13¾
No. 1 brass rod turnings .... 12½—12¾

Aluminum

Alum. pistons and struts .... 6½— 7
Aluminum crankcase ..... 8½— 9
1100 (2s) aluminum clippings 10 —10½
Old sheet and utensils ..... 8½— 9
Borings and turnings ..... 4½— 5
Industrial castings ..... 9 — 9½
2020 (24s) clippings ..... 10 —10½

Zinc

New zinc clippings ..... 7 — 7¼
Old zinc ..... 4 — 4½
Zinc routings ..... 3 — 3¼
Old die cast scrap ..... 2 — 2¼

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 23-23.50
Clean Monel turnings 16.50-17
Old sheet Monel 22-23
Nickel silver clippings, mixed 13
Nickel silver turnings, mixed. 15

Lead

Soft scrap lead ..... 8 — 8¼
Battery plates (dry) ..... 3 — 3¼
Batteries, acid free ..... 2 — 2¼

Miscellaneous

Block tin ..... 79 —80
No. 1 pewter ..... 59 —60
Auto babbitt ..... 43 —44
Mixed common babbitt ..... 10¼—10¾
Solder joints ..... 14½—15
Siphon tops 41
Small foundry type ..... 9¾—10¼
Monotype ..... 9¾—10¼
Lino. and stereotype ..... 8¾— 9
Electrotype ..... 7½— 7¾
Hand picked type shells ..... 5¼— 5¾
Lino. and stereo. dross ..... 2¼— 2¾
Electro dross ..... 2¼— 2¾

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Castle, Pa.									7.425* *M10*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1; C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Oct. 17, 1960)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18 ga. & hvyr.*	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Coke* *1.25-lb.* base box	Electro** *0.25-lb.* base box	Hollowware Enameling *29 ga.*
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*		7.225 *E2*				6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*										
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.95 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.95 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

† Electrogalvanized sheets.

(Effective Oct. 17, 1960)

*7.425 at Sharon-Niles is 7.225

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr'a. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,13*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Oct. 17, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owensboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore**	.10	7.87	9.71	10.16	10.78	8.44	9.13	8.65	11.90	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	.....	.....
Boston**	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.03	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	9.65	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.59[1]	11.29	12.20	11.29	9.70	10.45	9.55	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.13	10.20	.....	11.39	8.81	9.16	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.59
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia**	.10	8.45	9.70	11.50	10.95	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.03	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	21.20	20.45
Portland**		9.45	11.30	12.35	11.45	9.60	10.80	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco**	.10	10.27	11.79[2]	11.50	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.75	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.84	10.99	11.16	8.83	9.33	8.97	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga. x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅜"; cold drawn—15/16" to 2⅜" round; Hot-rolled 4140—⅝" to 2⅜" round, cold drawn—15/16" to 2⅜" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Oct. 17, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)	
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46
Machine Screws—bulk		
¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Oct. 17, 1960)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	43.75	71.75	54.75	64.75	30.00	30.00	31.25-31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R5;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Annld	Merch. Wire Galv.
	Col	Col	Col	Col	Col	¢/lb.	¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****..	173	190	.....	190	190	9.00	9.675
Atlanta *A8***....	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*.....	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*.....	173	191	177	212	197	9.00	9.75
Chicago *R3*.....	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*.....	173	.....	...	.....	.....	9.00	9.55†
Cleveland *A6*...	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*...	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*..	173	187	...	212	193	9.00	9.55
Duluth *A5*.....	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*...	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*.....	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	....	196	9.00	9.675
Joliet, Ill. *A5*....	173	187	...	212	193	9.00	9.55
Kokomo *C9**....	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2*****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**.	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*....	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	....	213	9.95	10.50
Rankin Pa. *A5*..	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*..	173	187	.....	....	193	8.65	9.20
S. San Fran. *C6*.	.....	.....	.....	236	.....	9.95	10.50
Sparrows Pt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*...	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*.	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD ½ In. Blk.	½ In. Gal.	¾ In. Blk.	¾ In. Gal.	1 In. Blk.	1 In. Gal.	1¼ In. Blk.	1¼ In. Gal.	1½ In. Blk.	1½ In. Gal.	2 In. Blk.	2 In. Gal.	2½-3 In. Blk.	2½-3 In. Gal.	SEAMLESS 2 In. Blk.	2 In. Gal.	2½ In. Blk.	2½ In. Gal.	3 In. Blk.	3 In. Gal.	3½-4 In. Blk.	3½-4 In. Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*9.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*9.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	*6.25	.....	*2.25	.....	0.75	.....	1.25	.....	1.75	.....	2.25	.....	2.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*9.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

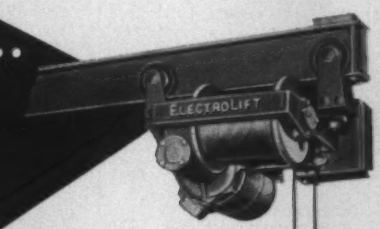
Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.)	
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

SMOOTH...
SWIFT...
SAFE...
SILENT...



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WORM-DRIVE HOISTS

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WORM DRIVE ELECTROLIFT HOISTS

6457

204 Sargeant Avenue Clifton, N. J.

Thermocouple Alloy
TRADE NAMES
vs.
ISA* STANDARDS

New data on Thermocouple alloys

Trade names CAN protect you . . . from improvements.

Specify Type K thermocouple wire per ISA Standards . . . and ask your supplier about his experience with the new Thermo-Kanthal alloys.

Their increased stable life means more accurate readings for longer periods . . . with no change in instrumentation required.

If your supplier's tests are not completed, write for Thermo-Kanthal Alloy Bulletin and lower prices.

May we quote on your bare and insulated wire requirements?

KANTHAL

* Instrument Society of America

THE KANTHAL CORPORATION

22 Amelia Place, Stamford, Conn.
Canadian Representative
Ferro Enamels, Oakville, Ont.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25			
Cleveland *R3*						15.35
So. Chicago *R3*				10.10		
Ensley *T2*	5.75	6.725				
Fairfield *T2*		6.725		10.10	6.875	
Gary *U1*	5.75				6.875	
Huntington, *C16*		6.725				
Ind. Harbor *I3*				10.10		
Johnstown *B3*		6.725				
Joliet *U1*			7.25			
Kansas City *S2*				10.10		15.35
Lackawanna *B3*	5.75	6.725	7.25		6.875	
Lebanon *B3*			7.25			15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*						15.35
Pittsburgh *J3*				10.10		
Seattle *B2*					6.75	15.85
Steelton *B3*	5.75		7.25		6.875	
Struthers *Y1*				10.10		
Torrance *C7*					6.75	
Williamsport *S5*		6.725				
Youngstown *R3*				10.10		

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*		10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70		
Detroit *D1*	9.05	10.50	12.70	15.70	
Detroit *D2*	9.05	10.50	12.70		
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*			12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*		10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
- Rolled elliptical, 18 in. or longer, 5000 lb lots 48.00
- Electrodeposited, 5000 lb lots ... 39.50

Brass, 80-20, ball anodes, 2000 lb or more 53.00

Zinc, ball anodes, 2000 lb lots 20.50
(for elliptical add 1¢ per lb)

Nickel, 99 pct plus, rolled carbon, 5000 lb 1.0225
(Rolled depolarized add 3¢ per lb)

Cadmium, 5000 lb 1.40

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 65.90

Copper sulphate, 25.2 Cu min, 6000 to 12,000 lbs per cwt $13.75

Nickel sulfate, 5000 to 23,000 lbs... 29.00

Nickel chloride, freight allowed, 100 lb 45.00

Sodium cyanide, domestic, f.o.b. Chicago, 200 lb drums 25.00

Zinc cyanide, 100 lb 60.75

Potassium cyanide, 100 lb drum N. Y. 45.50

Chromic acid, flake type, 10,000 lb or more 30.44

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R.	11.50
Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots	25.75
Carbonyl Iron (200 lb lots)	88.00
Welding Grades	8.10
Cutting and Scarfing Grades	9.85
Hydrogen reduced, domestic	11.25

Copper Powders

Molding Grades	
Electrolytic, domestic, f.o.b. shipping point.	15.00†
Atomized	46.5 to 64.5
Reduced	15.00†
Chemically Precipitated	44.5
Brass, 5000-lb lots	35.1 to 52.2
Bronze, 5000-lb lots	53.1 to 56.7
Chromium, electrolytic	5.00
Lead	7.50†
Manganese, electrolytic ...	$1.00
Molybdenum .....$3.60 to $4.35	
Nickel	$1.15
Carbonyl Nickel, 20,000 lb lots	$1.01
Nickel-Silver, 5000 lb lots..	60.7 to 69.0
Silicon	70.00
Solder	7.00†
Stainless Steel, 316	$1.07
Stainless steel 304	89.00
Tin	14.00†
Titanium, 99.25 + pct, per lb, f.o.b.	$11.25
Tungsten, carbide grades...	$3.25

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville . Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

Cladding	Plate (*L4, C4, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type 302	.....	.....	.....	37.50
304	28.80	31.55	34.30	40.00
316	42.20	46.25	50.25	58.75
321	34.50	37.75	41.05	47.25
347	40.80	44.65	48.55	57.00
405	24.60	26.90	29.25	.....
410	22.70	24.85	27.00	.....
430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 44.20; 1 side, 36.80.

(Effective Oct. 17, 1960)

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky....	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk...	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $158.00	
Childs, Hays	163.00
Chicago District	168.00
Western Utah	183.00
California	185.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O. 163.00-168.00	
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union, Pa.	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Standard chemically bonded, Baltimore, Md. $620.00	
Gary, Ind.	658.50
Standard, Pascagoula, Miss.	647.50
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Baltimore	585.00

Magnesite Brick

Standard, Baltimore $715.00	
Chemically bonded, Baltimore	655.00
Chemically bonded, Pascagoula, Miss.	682.50

Grain Magnesite

St. ⅜ to ½-in. grains

Per net ton

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b., Pascagoula, Miss...	80.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks 52.00-54.00	

Dead Burned Dolomite

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

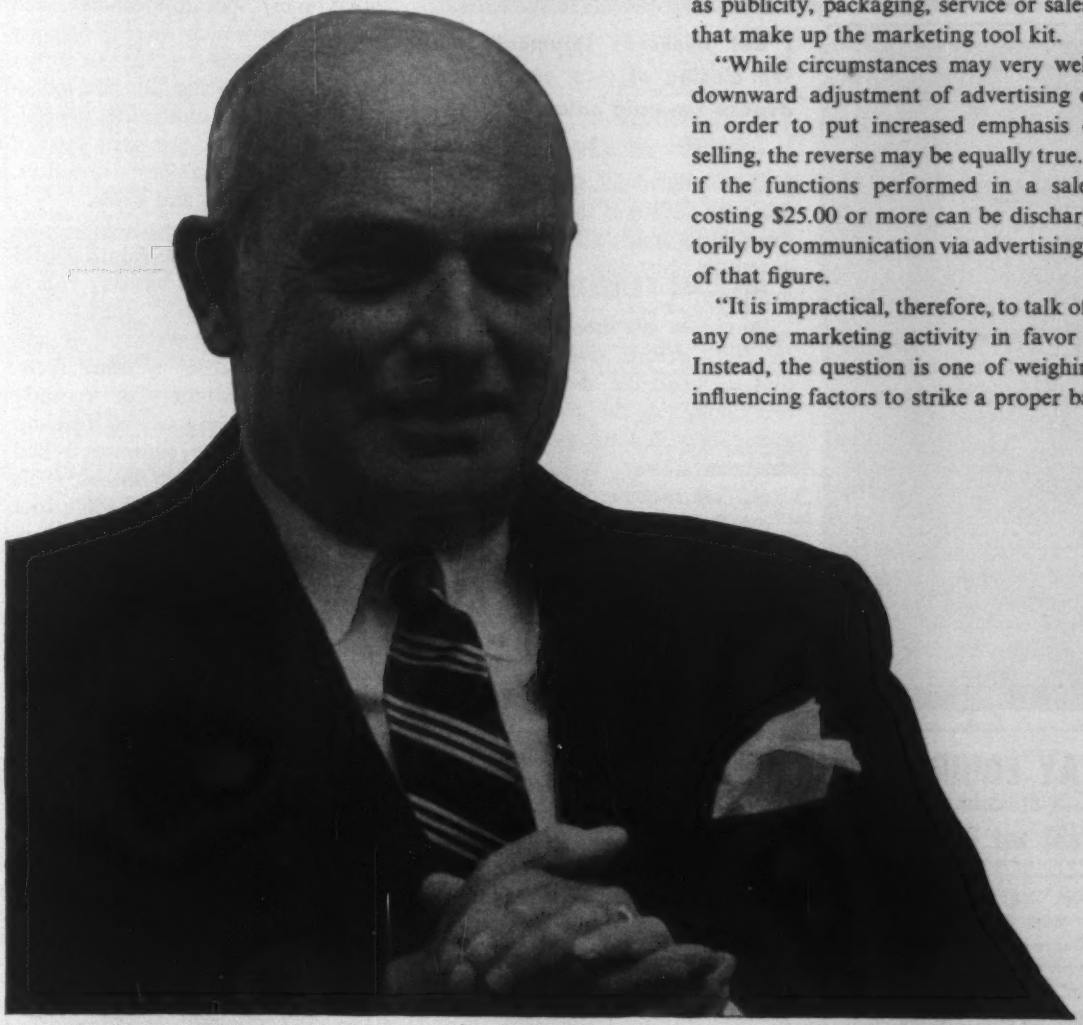
* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

"Why not cut out advertising and use the money to hire more salesmen?"

ROBERT HELLER, for 30 years a consultant to management of leading industrial firms and head of Robert Heller & Associates, Inc., Cleveland, answers a question that has crossed the minds of countless business executives.



"Advertising, although indispensable in our modern economy, can never perform the entire marketing job by itself. But neither can direct selling, nor any other single one of such sales-producing influences as publicity, packaging, service or sales promotion that make up the marketing tool kit.

"While circumstances may very well indicate a downward adjustment of advertising expenditures in order to put increased emphasis on personal selling, the reverse may be equally true. Particularly if the functions performed in a salesman's call costing $25.00 or more can be discharged satisfactorily by communication via advertising at a fraction of that figure.

"It is impractical, therefore, to talk of eliminating any one marketing activity in favor of another. Instead, the question is one of weighing all of the influencing factors to strike a proper balance."

AIA

ASSOCIATION OF INDUSTRIAL ADVERTISERS

271 madison avenue • new york 16, n. y. • telephone murray hill 5-8921

An organization of over 4000 members engaged in the advertising and marketing of industrial products, with local chapters in ALBANY, BALTIMORE, BOSTON, BUFFALO, CHICAGO, CLEVELAND, COLUMBUS, DALLAS, DENVER, DETROIT, HAMILTON, ONT., HARTFORD, HOUSTON, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, MINNEAPOLIS, MONTREAL, QUE., NEWARK, NEW YORK, PHILADELPHIA, PHOENIX, PITTSBURGH, PORTLAND, ROCHESTER, ST. LOUIS, SAN FRANCISCO, TORONTO, ONT., TULSA, YOUNGSTOWN.

VARIABLE VOLTAGE DRIVES
3 PHASE 60 CYCLE

Quan. Size Description
2—3000 HP DC MOTORS—525 V. 600 RPM Whse. M. G. Sets—2500 K.W. Whse., 2300/4160 V.
1—2750 HP DC MOTOR 450 V. 300 RPM Elliott 2200 K.W., Gen. Elec. 3 unit 450 V. DC Gen. with 3000 H.P. 720 RPM, 2300 V. AC Motor and Etc.
1—2250 HP DC MOTOR 600 V. 400/500 RPM, G.E. M.G. Set—2000 K.W. G.E. AC Motor—2300 V.
1—1500 HP DC MOTOR 600 V. 600 RPM Whse. M. G. Set. 1500 K.W. G.E. 13,200 V.
1—1500 HP DC MOTOR 600 V. 300/700 RPM Whse. M.G. Set—1500 K.W. G.E. 13,200 V.
For listing of Motors, Generators, Transformers, M.G. Sets, Rectifiers, Mill Motors, etc.
See last week issue.
Write — Phone — Wire
BELYEA COMPANY, Inc.
47 Howell St., Jersey City, N. J.
Tel. Oldfield 3-3334

R. R.
EQUIPMENT
HOPPER TANK CABOOSES
FLATS GONDOLAS BOXES
AND SPECIAL DESIGNS

WE WILL REBUILD
TO YOUR SPECIFICATIONS
OR BUILD NEW
AS REQUIRED

RAIL & INDUSTRIAL
EQUIPMENT CO., Inc.
30 CHURCH STREET
NEW YORK 7, N. Y.
PLANT: LANDISVILLE, PA.

RAILWAY EQUIPMENT
USED and RECONDITIONED
RAILWAY CARS and REPAIR PARTS

14—50-Ton Capacity, All-Steel
BOX CARS
Immediate Delivery Excellent Condition

DIESEL-ELECTRIC LOCOMOTIVES
1, G. E. 25-Ton, 150 H.P., Std. Ga.
3, G. E. 44-Ton, 400 H.P., Std. Ga.
1, G. E. 80-Ton, 500 H.P., Std. Ga.
1, BALDWIN, 120-Ton, 1000 H.P., Std. Ga.

IRON & STEEL PRODUCTS, INC.
13496 S. Brainard Ave. Chicago 33, Ill. Ph. Mitchell 6-1212
51-B E. 42nd St. New York 17, N. Y. Ph. YUkon 6-4766

Exports Sustain Detroit Dealers

Used machinery dealers in Detroit say overall business is worse than last year. Some customers are out of business.

But overseas shipments and the closing of two government depots now aid sales.

■ Used machinery sales in Detroit this year are lower than 1959. And, there is not much on which to base optimism for the coming three months.

Purchases just aren't being made. In fact, dealers are complaining that tool and die shops in Detroit are falling by the wayside. With every shop that closes, a potential customer is lost. And no replacements are showing up.

Out-of-state clients have been calling less frequently in recent months. But overseas sales seem to be helping out. Recent shipments to England, Sweden, Mexico, and South America are lending encouragement to local warehouses.

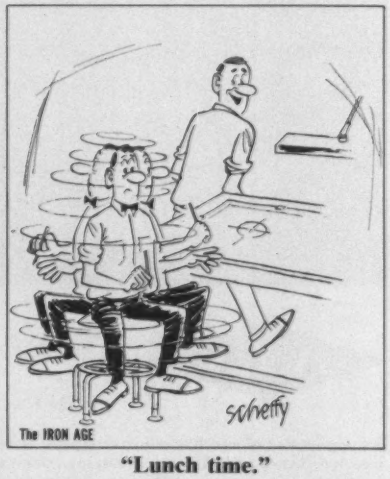
Rockwell - Standard Corp., for example has been purchasing a variety of used machines from several area dealers for shipment to South America. Recent shipments of standard and turret lathes and shapers went to Mexico. Special purpose equipment was exported to England, and automatic production machinery went to Brazil and Argentina.

Things are now reaching the point where used machinery dealers look for ways to cut overhead. There have been layoffs of personnel, but this is not prevalent. Larger companies have kept crews intact, putting them to work with inventory.

Inventories in Detroit are substantial. In particular there are a great many special machines such as T-lathes which were originally made to produce nose assemblies for a now faltering aircraft industry. Production equipment specialists report there are also lots of multi-matic machines, grinders, production lathes and drills.

But some Detroit dealers indicate they are on the lookout for cold heading equipment, thread rollers and press brakes.

Also indicating that all is not dark are a couple of other facts. First, Ford Motor Co. recently asked at least one tool and die shop to reserve all the capacity it had from October through March. This offers a ray of hope for some tool and die houses in the next six months. Also, two large government used machinery storage depots have recently been closed. Auctions over the past few years in these depots have hurt independent dealer sales.



"Lunch time."

One new Electric Arc Furnace Charging Bucket Including Bale

Type: Cable Operated—Clamshell

Capacity: 1486 Cu. ft=55 tons

Max Dia Closed: 17'-9"

Max Dia Opened: 18'-8"

Max Dia Bottom Opening 12'-6"

Distance from Eye of Bale to Bottom of Bucket Open and Closed: 14'-0"

Weight: 48,000 lbs

BOX H-108
c/o The IRON AGE, Chestnut at 56th, Phila. 39

COMPRESSORS

No better values at any price

100 CFM 100 psi 8 x 7 Ing. or Worth.
138 CFM 100 psi 7 x 7 Ing.—CPT—Worth.
142 CFM 125 psi Ingersoll Rand Type 40-Jaeger.
183 CFM 150 psi 7 x 7 Joy WG9.
191 CFM 300 psi 9-4¼ x 9 ES-2.
194 CFM 125 psi 7-7-8 x 5 Worth. M40.
254 CFM 100 psi 9 x 9 Ing.—Worth. Chic. Pneu.
290 CFM 75 psi 10 x 9 Ing. ES-1.
384 CFM 100 psi 10 x 9 Joy WG8.
485 CFM 100 psi 12 x 11 IR—Amer.
502 CFM 125 psi 12 x 13 Ing. Rand. Worth
585 CFM 100 psi 15-9¼ x 12 Ing.
688 CFM 125 psi 11½ x 7 x 7 Joy WN 102.
876 CFM 100 psi 15-9¼ x 12 Ing. XRB.
888 CFM 100 psi 14 x 13 IR—CPT.
877 CFM 125 psi 17/18½ x 14—IR—XRB.
1055 CFM 110 psi 18-11 x 12 CP. OCE.
175 hp G.E. Sys 3-60-200 volts, starter—MG set—Aftercooler Receiver.
1870 CFM 100 psi C300-300H Fuller Rotary.
300 hp West. Sys. 3-60-440, 80% PF.
Portable Gas-diesel 80"-900".

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NORTH BERGEN, N. J.
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REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

"PACKAGE DRIVES"
FOR ROLLING MILLS & REELS

(1)—3000-HP G.E. Motor, 90/180 R.P.M.
(1)—3000-KW Allis-Chalmers, 600-VDC, M-G Set, with 5000-HP Motor, 13800/6900/4160-Volt.

★ ★ ★ ★

(1)—1500 HP Westinghouse Motor, 300/700 R.P.M. and
(1)—1250-KW M-G Set, 600-VDC with 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(1)—1400-HP G.E. Motor 165/300 R.P.M. and
(1)—1200-KW M-G Set, 250-VDC with 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(2)—750-HP Westinghouse Motors, 300/700 R.P.M. and
(1)—3-unit M.G. Set—(2) 600-KW Generators and 1750-HP Motor, 2300/4000-Volt.

★ ★ ★ ★

(2)—235-HP Westinghouse Motors, 325/975 R.P.M.
(1)—500-KW Westinghouse M.G. Set, 250-VDC, with 700-HP Motor, 2300/4000-Volt OR
(1)—3-unit Westinghouse M.G. Set with (2) 250-KW Generators and 700-HP Motor, 2300/4000-Volt.

All M.G. Set Drive Motors are Synchronous, 3-phase, 60 cycle. Will sell any of these items separately.

Can furnish any type of Starting Equipment for the Synchronous Motors, necessary exciter sets and D.C. Motor Control.

T. B. MAC CABE COMPANY

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Cable Address — **Phone**
"Macsteel" Philadelphia Pa. — **Davenport 4-8300**

UNIVERSAL Machinery & Equipment Co.

AMERICA'S LARGEST STOCK OF FOUNDRY EQUIPMENT

• ARC MELTING FURNACES
250# LECTROMELT—185 KVA
500# LECTROMELT—200 KVA
1000# SWINDELL—500 KVA
2000# SWINDELL—1000 KVA
3000# HEROULT, Door Charge—800 KVA
DETROIT FURNACES—10 lb. to 3000 lb. Cap.

• INDUCTION HEATING FURNACES
75 KW TOCCO M.G. Induction Heater
20 KW THERMONIC Induction Heater
20 KW ECCO Induction Heater
15 KW GIRDLER Dielectric Heater

• INDUCTION MELTING FURNACES
20 KW AJAX Spart Gap 17# Melting
50 KW VACUUM Melting, Complete—Like New
100 KW AJAX Melting Installation—Late
200 KW, 960 cycle, 1000# steel

• HEAT TREAT FURNACES
36"x72" Gas Fired Box, 1950°F.
4'x4'x10' Gas Fired Box
7' G. E. Rotary Hearth Electric, 1900°F.
36" dia. x 36" deep Electric Recirculating
42" wide roller Hearth 50'L w/atmos. gen.
24"x16'Lx36" 210 KW conveyor, 1400°F.
18"x12"x24" LINDBERG 2500°F. hydrogen

• CLEANING EQUIPMENT AND GRINDERS
15x20 WHEELABRATOR
20x27 WHEELABRATOR
27x36 WHEELABRATOR w/loader
36x42 WHEELABRATOR w/loader
48x42 WHEELABRATOR w/loader
48x72 WHEELABRATOR
dust Collectors available for all machines
WHEELABRATOR No. 1-A Multi Table
72" WHEELABRATOR Swing Table
96" WHEELABRATOR Swing Table
9' LK PANGBORN Table-room
WHEELABRATOR Pipe Cleaning Cabinet
SAFETY 10 H. Swing Grinder
WHITING 26"x54" tumbling barrel

WHEELABRATOR WELDMENT CLEANING CABINET
200 operating hours . . . . . Like New
Replacement cost over $100000
Any reasonable offer will be accepted.
SAVE — SAVE — SAVE — SAVE — SAVE

1630 NORTH NINTH ST. READING, PA PHONE FRANKLIN 3-5103

IMMEDIATELY AVAILABLE

Because of Mill Consolidation

3 LEE WILSON RECTANGULAR BELL-TYPE ANNEALING FURNACES

atmosphere-[redacted]olled with 9 bases, are available. Each [redacted]oximately 7' x 7' x 14' Excellast when used [redacted]manufacture of steel coils, they have a ca[redacted]y of 50 tons per charge. These top-grade furnaces are still set up in the plant. Tremendous values specially priced for prompt sale.

NATIONAL MACHINERY EXCHANGE
126 Mott St. — New York 13, N. Y.
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ENGINEERED TO YOUR REQUIREMENTS

Ornitz Equipment Corp.

Industrial Engineering Service
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AMERICA'S CRANE REBUILDING SERVICE LARGEST

- ANY CRANE CAN BE MODERNIZED TO THE MOST EXACTING SPECIFICATIONS
- MECHANICAL & ELECTRICAL RECONDITIONING
- BRIDGE SPANS & HEADROOM ALTERED
- OVER 100 USED CRANES AVAILABLE
- MANUFACTURERS OF SilenTorque CRANES

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SOUTH KEIM STREET, POTTSTOWN, PA. — FAculty 3-5500

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THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

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No. 6 Barnes Twin Spindle Horizontal, Hydraulically Reciprocated, m.d.
No. 182 Barnes Drill, m.d.
No. 854 Micromatic Vertical Honing Machine, m.d.
H4 Micromatic Horizontal Hydrohoner, m.d.
No. 306H Barnes Twin Spindle
No. 2248 Barnes Honing Machine, m.d.

KEYSEATERS
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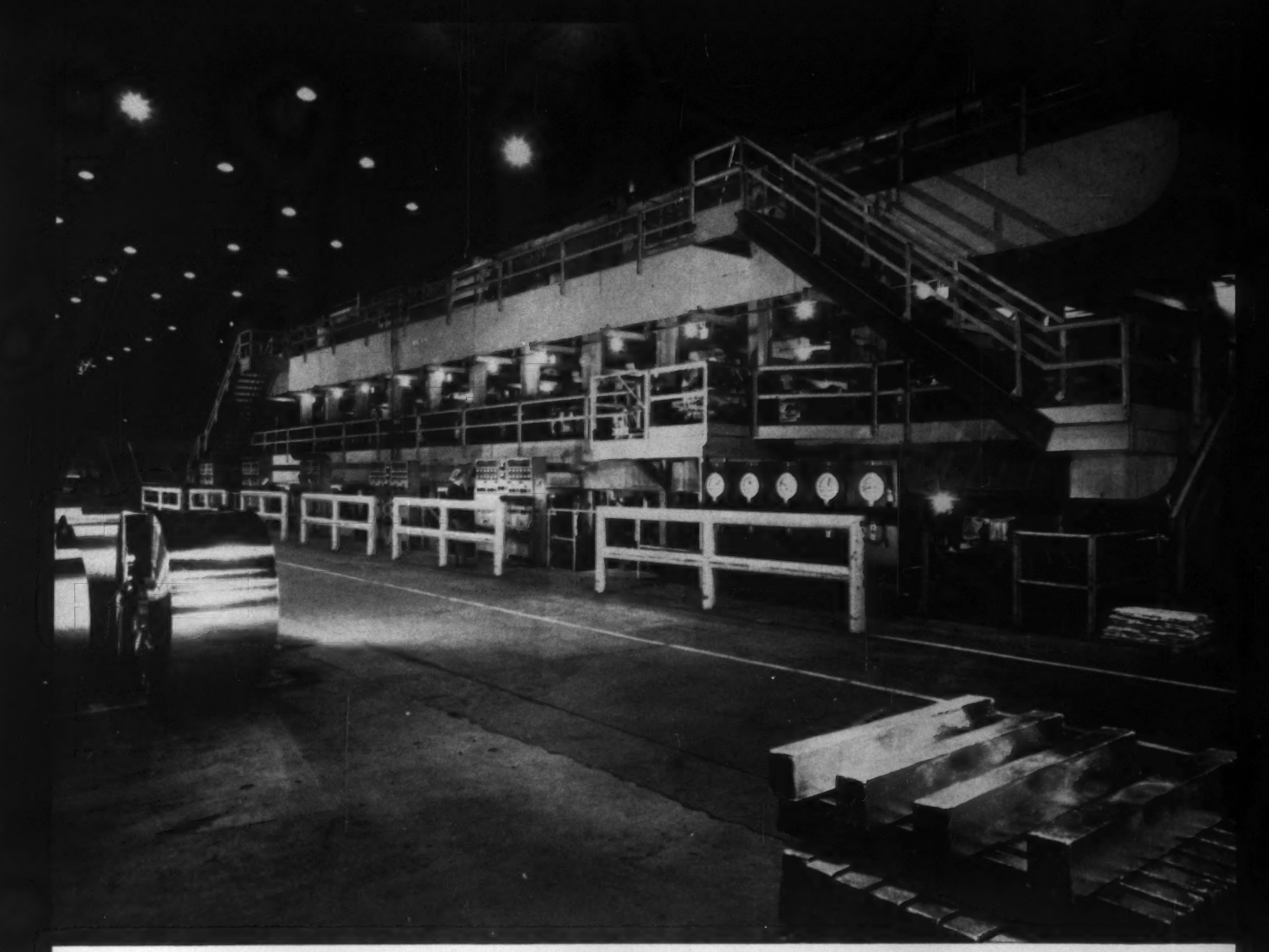

Three Wean Electrolytic Tinning Lines produce high-quality tin plate at J&L

The No. 3 electrolytic tinning line at Jones & Laughlin's Aliquippa Works illustrated is one of three Wean lines installed by Jones & Laughlin Steel Corp. to meet the growing demand for high-quality tin plate.

Employing the horizontal acid (Halogen) plating process and induction reflow brightening, this line is capable of producing tin plate at speeds up to 2000 fpm. It can handle 40,000 lb coils up to 70″ O.D. with a maximum width of 42″. The line equipment is designed to process a range of gauges from .0055″ to .025″.

J & L's three Wean tinning lines are testimony to Wean's contributions to electrolytic tinning technology since the installation of the first commercial line 18 years ago. Wean "creative engineering" has accounted for 52 of the electrolytic tinning lines designed to serve markets around the world. We invite you to use this experience on the next expansion or modernization of your tin plate facilities.

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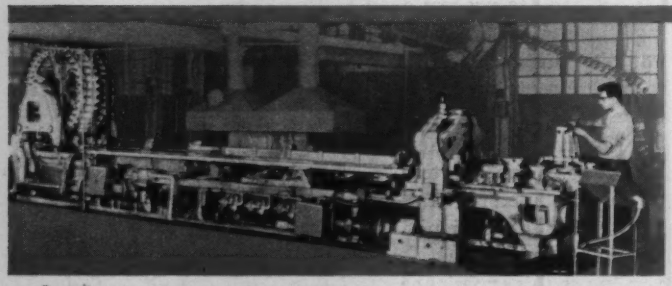
Punch cards do most of the "thinking" for this big slabbing-blooming mill built by Bliss' Rolling Mill Division. Most modern of its type in the world, it can roll a steel ingot into a 6-inch-square bloom in a matter of minutes. The rolls (supplied by Bliss' Mackintosh-Hemphill Division, by the way) reset themselves automatically between passes.

A breath of air and some to spare

New PocketAIRE respirator developed by Rockwood Sprinkler Division of Bliss' subsidiary Gamewell fits in pocket yet provides supply of air for up to 25 minutes rescue work in smoke or fume-filled areas, plus 5-minute reserve for escape when main supply is exhausted. Oxygen flow is automatically metered to prevent over-rapid consumption.

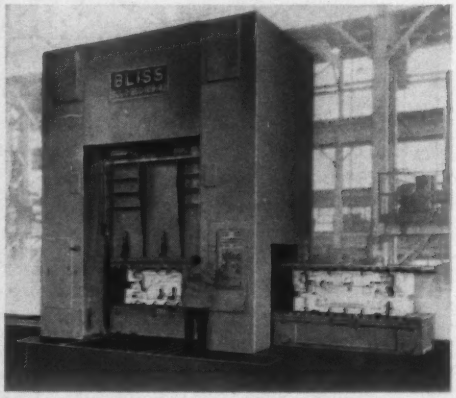
From metal slug to extruded can

Recent Bliss contribution to the technology of cold forming is this high speed impact extrusion press. It shapes a 6-inch-deep aluminum can from a ⅛-inch-thick circular blank with a single blow at the rate of two per second, twice the speed of the fastest equipment previously available.



Growing trend among food packers

A growing number of food packers are installing equipment to make their own cans. Recent case in point is this complete can line built by Bliss' Container Machinery Division for a large Midwestern packer. It turns out 400 to 500 sanitary cans per minute, ready for filling and sealing.



Rolling bolster pleases the boss

Changing dies in big presses used to shut the press down for a full shift. Not so with the new Bliss rolling bolster press. It enables the die setters to preload the unused bolster while the press is running. Actual die change time is cut to minutes.